THE REFINER AND NATURAL GASOLINE MANUFACTURER

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California Growing Factor in Eastern Gasoline Market

Index of the Refiner and Natural Gasoline Manufacturer for 1925

Unsaturates, Aromatics and Naphthenes Change Complexion and Value

Testing Tank Car Safety Valves by Air

Keeping Men Sold on Their Jobs

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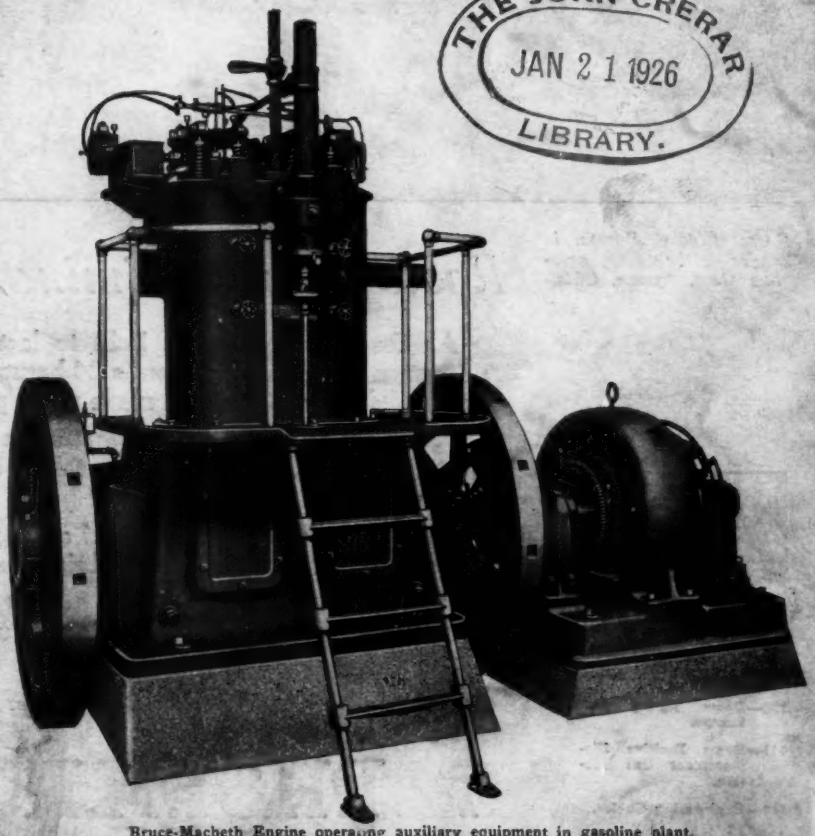

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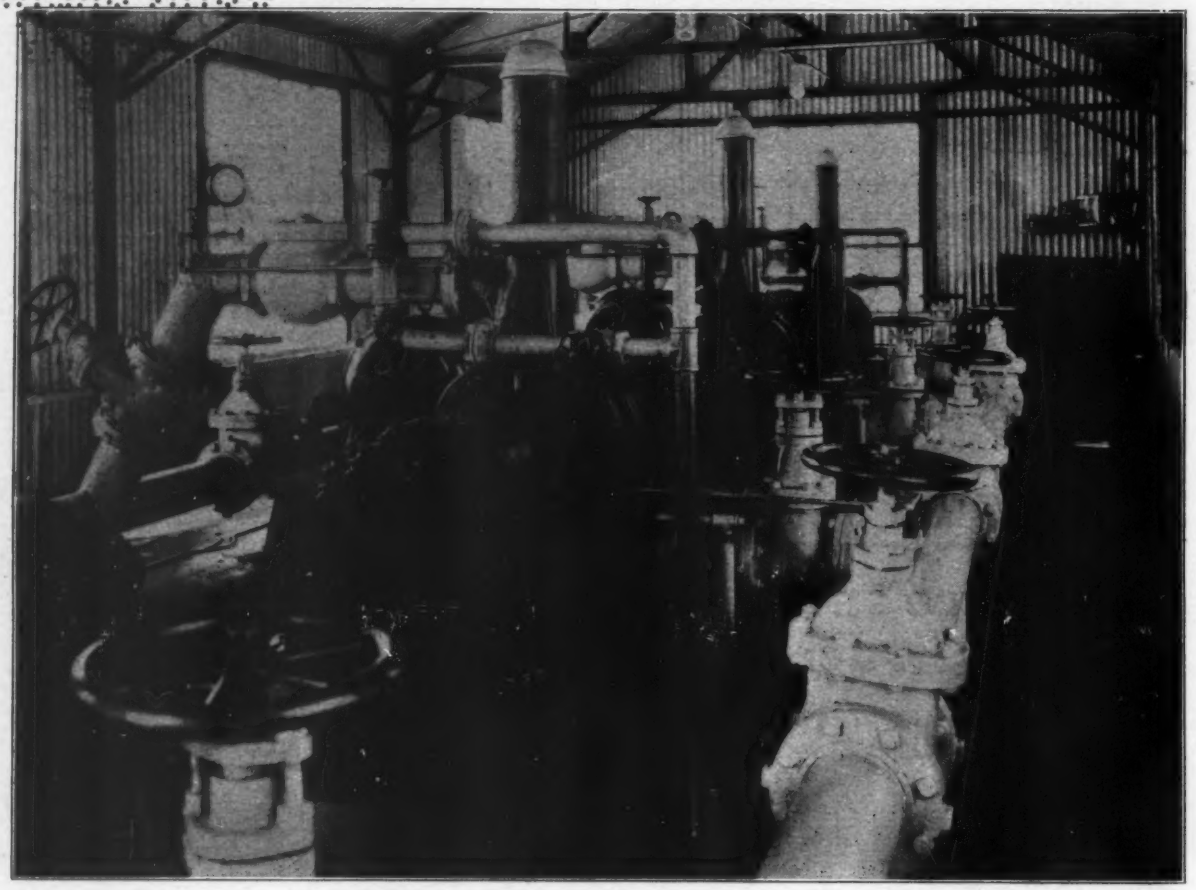

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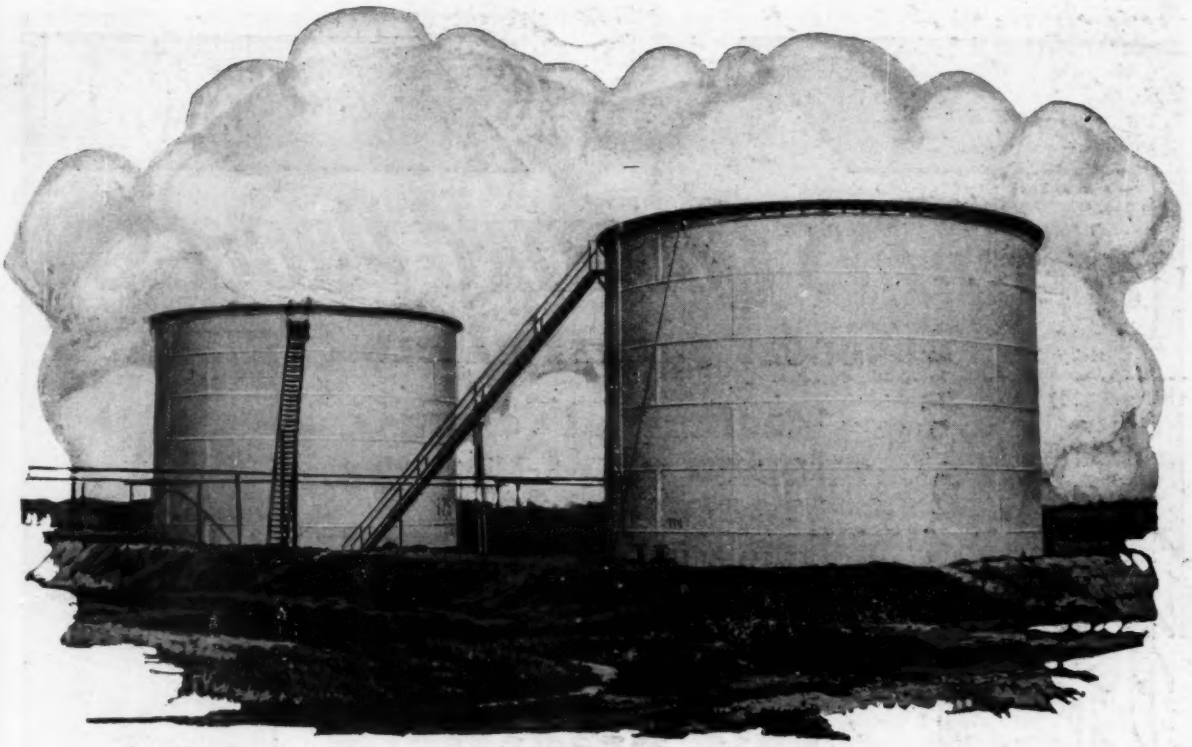

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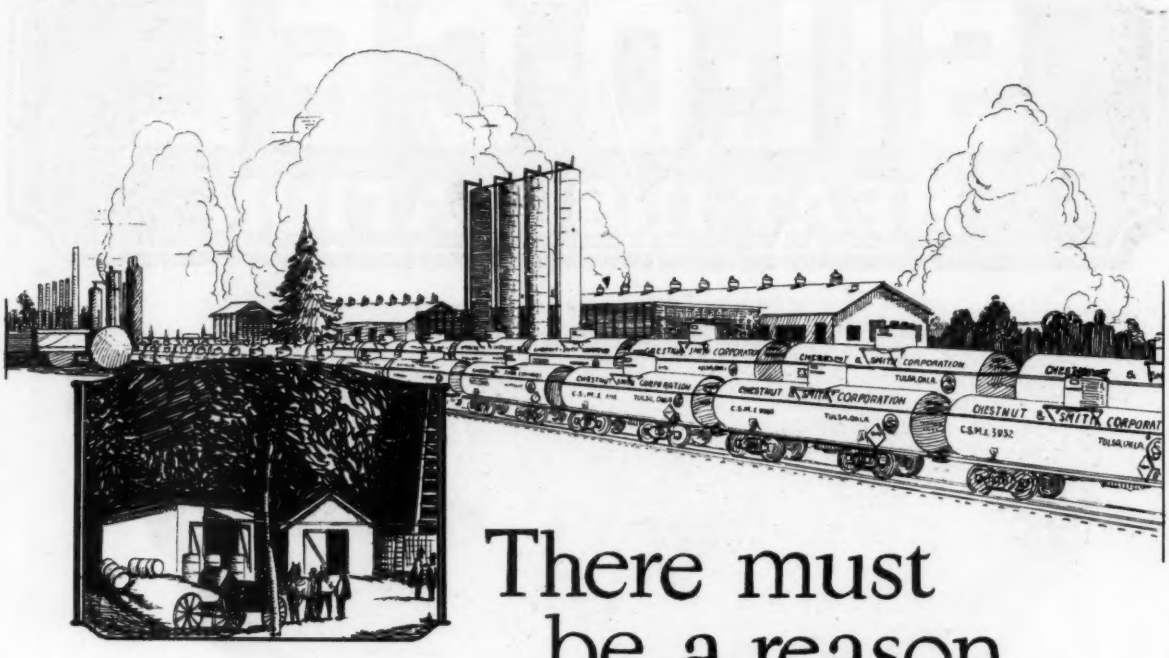

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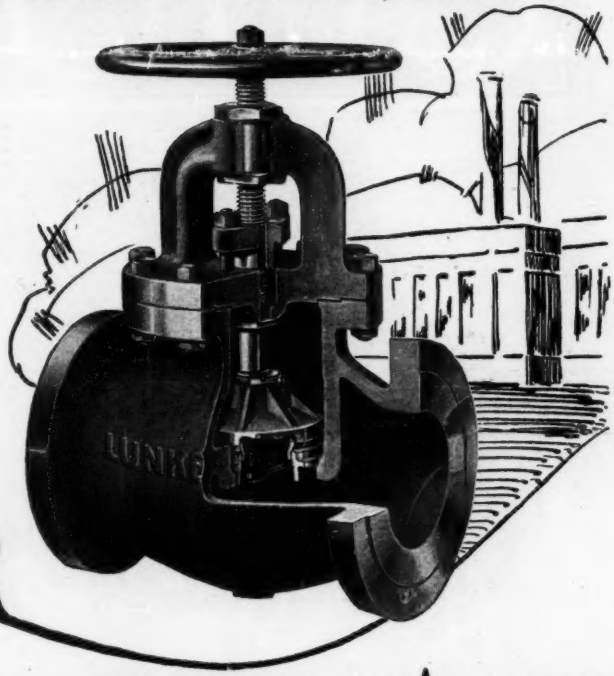

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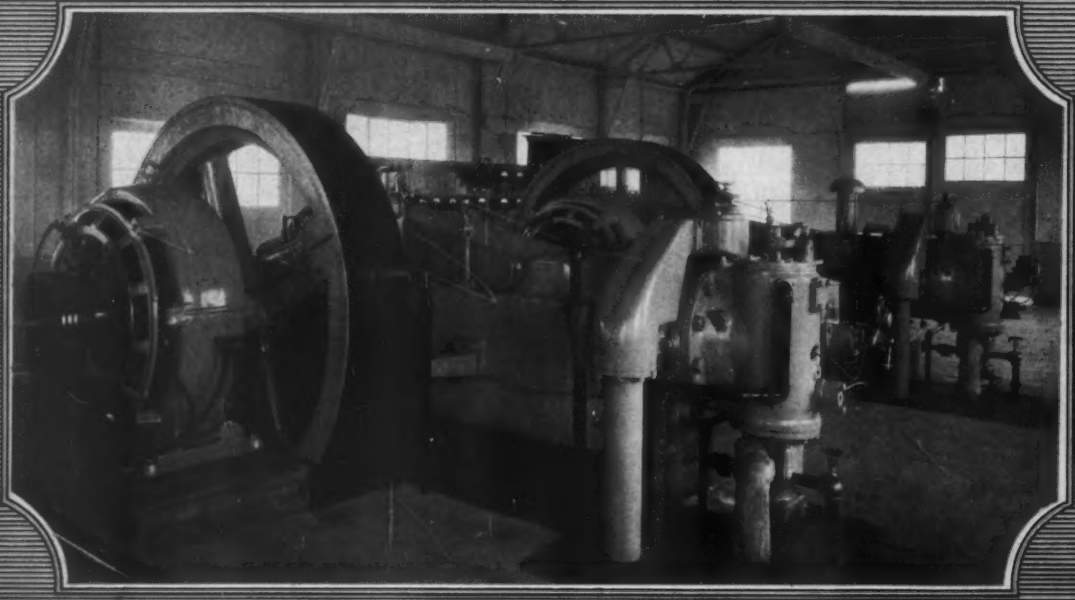

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California Growing Factor in Eastern Gasoline Market

Introduction of cracking equipment may strengthen position of Pacific Coast output

By Grady Triplett

THE other day a refiner, who knows his costs down to the sixth decimal, came out with the statement that California gasoline is being delivered at filling stations in eastern Ohio at a price less than that for its manufacturer in Illinois.

He spoke of it as something unfair. Unless he has done some calculating on costs outside of his own plant, he perhaps still wonders how gasoline refined on the Pacific cost from crude oil produced in California, can be loaded in tankers, carried through the Panama canal, unloaded at some Atlantic port, unloaded and shipped in tank cars, unloaded at a local station in Ohio and the total cost of all that being less than it costs him to turn out gasoline at a point in the Middle West.

In both the Mid-Continent and in the Middle Western states the attitude of the refiner has been that the intrusion of California gasoline on the East Coast and as far inland as Ohio has been that the condition is unfair. Some are still prone to look on it with that attitude. Some are asking the general question, "what is to be done about it?"

Meet Conditions

A few are down to the conclusion that the only thing to do about it is to accept it and adjust their own businesses to meet it. These look on the presence of California gasoline east of the Rocky Mountains as the result of economic conditions that may be permanent.

To class the California petroleum fields as a permanent factor in the Eastern petroleum price structure may be putting it on too broad a scale. But the way California gasoline and crude oil have suddenly come into prominence in the Eastern States is evidence that the situation can not be looked on as a flurry that will pass in a few months, leaving the Eastern Refiner and the Mid-Continent refiner in possession of the territory once held without interference.

New Fields

California shifted part of its petroleum weight to the Atlantic side of the Unitde States in 1923, having made a few moves in that direction in 1922. First crude oil was the dominating product. Shipments of California crude oil through the Panama canal for delivery at Atlantic or Gulf Coast parts amounted to 52,983,000 barrels, while gasoline shipments were 156,171,520 gallons.

Crude oil deliveries dropped to 40,073,000 barrels in 1924, whi.e gasoline deliveries reached 224,964,360 gallons. The record for 1925 is not yet written but it is certain from figures of the first nine months that crude oil shipments will show a marked drop, while gasoline will go still beyond the 1924 total, for July of this year saw 80,000,000 gallons of gasoline shipped from California for Atlantic coast delivery, while both March and April were months with totals of 60,000,000 each. Two months, April and August, had deliveries in excess of 50,000,000 gallons.

When California gasoline shipments to the Atlantic seaboard reached high figures early last summer, the cause was given as "a lot of cheap gasoline on the Pacific coast." While this was true, the attitude with which other refiners accepted it was not true. Men were prone to look on the affair as one of fleeting duration, something to cause trouble for a spell and then pass. But California gasoline had been a growing factor for the two years previous.

There is just one cause for the presence of gasoline or crude oil from California at any port on the Atlantic side of the United States. That is a surplus of the products so far as Pacific coast consumption is concerned.

That being the one condition that can give California a chance to compete east of the Rockies, it is also true that the Western State may remain a factor in the whole petroleum structure of the nation just as long as there is surplus on the western side of the nation.

Always Ready

It is true that California gasoline may be stopped temporarily by conditions of temporary nature. Prices may get so low that California gasoline can not compete on the Atlantic seaboard. But that will not prevent California gasoline from being a factor in petroleum prices, so long as there is a surplus there. For any balance in the way of surplus that California may

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CALIBRATION	60 Degrees Fahrenheit.	CALIBRATION	60 Degrees Fahrenheit.
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SCALE	Graduated in 1/4° A.P.I.	SCALE	Graduated in 1/4° A.P.I.
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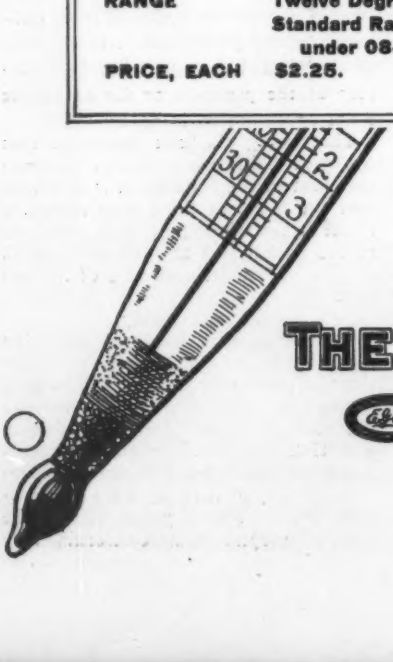

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have will hang by a thread to keep prices on gasoline from other sections at a level set by California refiners.

Growth of gasoline traffic through the Panama canal in the past three years is evidence that gasoline made in the Mid-Continent, along the Gulf of Mexico, in the Middle West or on the eastern seaboard is not going to sell at any higher price than California gasoline can be sold at a given point.

That is a statement based on the time-worn premise of the law of supply and demand.

Where refiners of other sections seem to be following a false permise is in the hope of California being only a temporary factor and also in their somewhat secret feeling of unfairness that they should be forced to compete with gasoline from the Pacific Coast.

There is no more unfairness in the situation than there would be were conditions reversed. Mid-Contiennt gasoline was shipped by train to the Pacific Coast in 1920. It so happened that the movement of Mid-Continent gasoline did not pull down prices for California refiners.

Back in 1920

But it is a safe statement to make in retrospect that Mid-Continent gasoline would have been shipped to California in 1920, even if it had meant a lower price for the gasoline made there. And it is safe to predict that the refiners of any other section of the United States will sell in California at any time conditions are favorable, regardless of what may thereby happen to the finances of the refining concerns of that state.

Something not commonly considered in the position of California as a factor in the nation's gasoline supply is the tendency toward the installation of cracking plants on the Pacific Coast. Use of pressure methods of refining is of such little consequence in California that the Bureau of Mines statistics do not give the percent of gasoline from this source. Of the 161,986,000 gallons of gasoline produced in California in October, only 320,000 gallons came through cracking stills. The percentage of gasoline from cracking process was 28 per cent for the whole United States for October.

Statistics on refinery operation showing the yield from cracking methods are given below, being taken from the report of the Department of Commerce, through the Bureau of Mines:

	Gasoline P. oduced	Part by Cracking	Per-cent by
East Coast	145,717,000	52,265,000	36
Appalachian	39,346,000	10,756,000	27
Middle West	124,439,000	47,508,000	38
Okla.-Kansas	169,547,000	44,717,000	26
Texas	189,591,000	65,533,000	35
Louisiana-Ark.	56,470.000	14,600.000	26
Rocky Mt.	57,337,000	24,674,000	43
California	161,986,000	320,000	..
Totals	944,433,000	260,402,000	28

This tabulation reveals two facts pertinent to any consideration of economic conditions in the gasoline field. One is that California is producing more gasoline than any other geographical oil division of the United States. The other is the use of pressure equipment is negligible in this production.

Turning to Pressure

Now here is something worth considering. In the past three months numerous contracts have been signed for the installation of cracking units at California plants. One reason California plants have not been earlier equipped with cracking units has been that a plentiful supply of crude has made it possible to turn out sufficient gasoline by straight distillation.

Straight distillation can still turn out all the gasoline necessary for the logical sales territory for California gasoline. But it will take equipment of the finest type to turn out gasoline for the eastern slope of the United States as well as the western. The turn to cracking equipment is further evidence of the fact that California refiners intend to look with favor on the Atlantic seaboard as a market.

It has been so often stated that it has come to be accepted that gasoline produced by cracking methods costs less than by straight distillation. No figures are available to show just what saving is possible through use of pressure equipment. The type of stills and the type of charging stock are factors in any particular case.

But if California refiners reduce their manufacturing costs by the introduction of cracking equipment, certainly the refiner of the Middle West or the Mid-Continent or the Gulf Coast faces no immediate relief from what he may consider a temporary bother.

On the contrary it looks like California gasoline has come to stay as a factor in the supply and in the price structure of gasoline produced in any other section of the United States and in any other nation that has a seaport.

The whole proposition finally gets back to the supply of crude oil. As long as there is more crude produced in California than is necessary to supply the refined requirements of the district, the surplus stands ready to crowd into other territories. And why not?

Movement of California Oils to Atlantic and Gulf Ports

	Shipments from California through Panama canal to Atlantic seaboard and Gulf ports. Form Department of Commerce statistics. Crude oils in barrels*	Refined oils in gallons*	Receipts of California crude oil and refined products. A. P. I. statistics.† Received at Atlantic ports barrels*	Received at Gulf ports barrels*
1923—				
January	985,000	.....	807 000	.....
February	1 740,000	3,514,280	1,096,000	.....
March	3,222,000	16,103,760	2,978,000	65,000
April	4,398.000	21,518,940	4,399,000	478,000
May	5,075,000	18,414,400	4,395,000	443,000
June	4 542,000	22,998,620	5,033,000	669,000
July	5,524,000	14,810,060	4,759,000	614,000
August	5,525.000	8,332,040	5,454,000	1,110,000
September	6.135,000	9,180,000	4.703,000	8 5,000
October	5,125 000	10.034.760	4,944,000	976.000
November	5,290,000	9,996.000	4,942,000	940,000
December	5,422,000	21,368,660	4,942,000	742,000
Totals	52,983,000	156,171,520	48,452,000	6,844,000
1924—				
January	5,055,000	14,861,400	4,832,000	715,000
February	4,631.000	13,853,980	5,006,000	640,000
March	4.551.000	10.316.620	4,563,000	.....
April	2,939,000	18,895,840	4,323,000	.....
May	3.631 000	16,979,720	3,792,000	315,000
June	3,353,000	18,154,300	3,822,000	.....
July	2,865,000	16,90 .760	2,896,000	75,000
August	2.534,000	60,647,760	4,069,000	30,000
September	3,554,000	15,683,900	3,583,000	.....
October	2,456,000	20,683,900	3,472,000	.....
November	2,087,000	10.308,140	2.734,000	.....
December	2,417,000	18,298,120	2,667,000	93,000
Totals	40,073,000	224,964,360	45,759,000	1,868,000
1925—				
January	1,436,000	22,695,000	2,251,000	.....
February	1,636,000	29,390 960	1,503,000	166,000
March	1,543,000	60,156,540	3,027,000	233,000
April	1,910,000	54,361,840	2.625,000	76,000
May	1,349,000	27,674,300	2,499,000	.....
June	1,107,000	60,729,260	1,736,000	315,000
July	971,000	80,729,260	2,523,000	265,000
August	1,301,000	53,387,140	2.046.000	178,000
September	995,000	25,180,000	1,892,000	158,000

*Figures in barrels have been calculated from long tons, so the totals are not exact.
†Gasoline and other refined products are included with crude oil in A. P. I. figures.

Gasoline Manufacturers to Have Part on A. P. I. Program

Sessions at Los Angeles will offer much of benefit to refinery executives

THE coming meeting of the American Petroleum Institute will have especial interest for the natural gasoline branch of the oil industry because a part of the program will be in charge of the Association of Natural Gasoline Manufacturers. Under group 4, this part of the program will come both morning and afternoon, January 20.

The program for the natural gasoline part of the meeting is not yet complete, as one paper is yet to be selected. It will be prepared by some man with headquarters on the Pacific Coast. As it now stands, three papers will be heard and discussion will follow each. The session will have the benefit of papers by E. L. Peck, president of the association, F. E. Rice, one of the vice-presidents; and D. E. Buchanan, an ex-president of the association.

Discussion of the papers will be led by men of standing within the industry.

First Time

This will be the first time the natural gasoline part of the petroleum industry has had part in one of the Institute programs. At the St. Louis meeting, however, the natural gasoline association held a meeting which was attended by men there to attend the Institute sessions later.

In Los Angeles, however, this process will be reversed, for the natural gasoline body will be taking part in the program of the Institute.

The refining branch of the oil industry also will come in for marked attention during the metting of the Institute.

Monday, January 18, the day before the opening of the Institute proper, will be given over to committee meetings. Among these will be a session of Committee D-2 of the American Society for Testing Materials. The work of this committee involves tests on motor fuels and for that reason is linked with the refining branch of the oil industry.

In the program of group 2, Wednesday, January 20, those interested in petroleum refining will have the benefit of papers.

"A New Gasoline Test Method", will be offered by W. S. James of the Associated Oil Company. H. C. Dickinson of the United States Bureau of Standards will discuss "Effects of Fuel and Engine Design on Starting." A. L. Clayden of the Sun Oil Company has the subject "Anti-Knock Gasolines and the High Compression Engine." Another paper by Mr. Dickinson will be "Purchase of Lubricants on a Quality Basis."

Operating Methods

Some papers on operating practices will come during the afternoon Wednesday. One by G. O. Wilson, Standard Oil Company (California) will be "Steam Protection for Oil Tanks." Another paper on a related subject will be offered by G. H. Haupt of the Standard Oil Company (New Jersey), "Fire Prevention and Protection in the Petroleum Industry."

Wednesday is the day set apart for sessions under Group 4 for the Association of Natural Gasoline Manufacturers.

The session Thursday will offer papers of interest to both the refiner and the Natural gasoline manufacturer in the line of credits and accounting. There will also be refinery technical subjects for that day.

The program is not complete, for some speakers have yet to be selected. The advance program, however, follows:

Monday, January 18

On Monday, January 18, the day prior to the convening of the sixth annual meeting, the following named committees will meet at the time fixed by the chairman of each committee in his notice to the members:

Committee Meeting at Los Angeles

Committee on Public Relations.

Committee on Fire Prevention.

Committee on Uniform Accounting.

Special Committee on Method of Testing Vapor Pressure.

General Committee on Railroad Transportation and its sub-committees.

Committee D-2 (A.S.T.M.) on Petroleum Products and Lubricants.

Committee on Standardization of Specifications for Steel and Iron Pipe for Oil Country Tubular Goods.

Committee on Standardization of Rig Irons.

Committee on Standardization of Wire Rope and Manila Cordage.

Committee on Standardization of Standard Rigs and Derricks.

Committee on Standardization of Cable Drilling Tool Joints.

Committee on Standardization of Pumping Equipment and Engines as Applied to the Production of Oil.

Committee on Standardization of Rotary Drilling Equipment.

Committee on Standardization of Belting.

Committee on Standardization of Oil Feld Boilers.

Committee on Standardization of Steel Storage and Production of Oil.

The California Committee on Reception and Entertainment is arranging to give an informal reception and smoker in the foyer of the ball room at the Biltmore Hotel at 8 o'clock in the evening.

Tuesday, January 19

10:30 a. m.—Meeting of the Board of Councillors. (To nominate candidates for election as members of the Board of Directors.)

2:30 p.m.—General session.

"Welcome to California," Thomas A. O'Donnell, California Petroleum Corporation.

The president's address, J. Edgar Pew.

Address, Paul Shoup, Southern Pacific Company.

Report of Board of Councillors and election of directors.

8:00 p.m.—General session:

Memorial service for the late Alfred C. Bedford. Address by Mark L. Requa.

Wednesday, January 20

Note: There will be no general session on Wednesday. The morning and afternoon will be devoted to group sessions, arranged by general topics, at which the various subjects will first be treated in addresses by selected speakers. After each speaker has finished opportunity will be given for general discussion on the subject.

10:30 a.m.—Meeting of Board of Directors. (Luncheon for members of the board at noon.)

10:00 a.m.—Group meetings:

Group 1—General topic: Standardization of Oil Field Equipment.

"Standardization of Belting," committee report, A. H. Riney, national chairman.

"Standardization of Oil Field Boilers." Committee report, A. B. Steen, national chairman.

"Standardization of Cable Drilling Tool Joints." Commitete report, Thomas Fleming, Jr., national chiarman.

"Standardization of Standard Rigs and Derricks." Committee report, W. W. Fondren, national chairman.

"Standardization of Steel and Iron Pipe for Oil Country Tubular Goods." Committee report, J. Edgar Pew, national chairman.

Group 2—General topic: Motor Fuel and Motor Lubrication.

"A New Gasoline Test Method," W. S. James, Associated Oil Company.

"Effects of Fuel and Engine Design on Starting," H. C. Dickinson, U. S. Bureau of Standards.

"Anti-Knock Gasoline and the High Compression Engine," A. L. Clayden, Sun Oil Company.

"Purchase of Lubricants on a Quality Basis," H. C. Dickinson, U. S. Bureau of Standards.

Group 3—General topic: Uniform Methods of Oil Accounting.

"Uniform Methods of Oil Accounting."

(Continued on page 44)

Unsaturates, Aromatics, Naphthenes Change Complexion and Value

By George W. Reed

IT IS to be regretted that all individuals of the petroleum industry do not own shares of Unsaturates, Aromatics and Naphthenes, preferred and common, for though this has been a dormant and idle investment for years, the stock at present is surely skyrocketing. This imaginary issue, however, is not "controlled," nor is it impossible to acquire. Late investigations and disclosures of the best technologists of teh industry have definitely shown that the individual refiner may secure a profitable portion of the issue by merely purchasing and installing a suitable cracking process. At the same time investigators have proven conclusively the inherent value of the issue to the motoring public.

Before going into the details of the desirable hydrocarbons it will be well to review the history of their development and exploitation. The cousins of the paraffin series of hydrocarbons—namely, the aromatics, unsaturates and naphthenes—were for years looked upon by the industry as undesirable and unworthy members or constituents of petroleum and its distillates. The status of the diolefins will be discussed later. Especially were the unsaturates dealt with, and in no uncertain terms designated as undesirable when occurring in gasoline in greater than certain specified quantities. Referring to certain bulletins and technical papers issued by the Bureau of Mines, covering such subjects as "Methods for Testing Petroleum Products," and "Specifications for Petroleum Products," adopted by the Interdepartmental Petroleum Specifications Committee, we find the unsaturated hydrocarbons closely regulated. Such regualtion occurs in Bulletin No. 5 (1920 and 1921; Technical Paper 298 (1922), also in 305 (1922), and later in 323. This specification for unsaturated hydrocarbons was as follows: "Aviation Gasoline, Fighting Grade, Method 550.1. Not more than one per cent of the gasoline shall be soluble in concentrated sulphuric acid."

"Aviation gasoline, Domestic grade, Method 550.1—Not more than 2 per cent of the gasoline shall be soluble in concentrated sulphuric acid." The determination of unsaturates in motor gasoline, commonly termed "Navy," was not included in the technical papers, probably because it was assumed that in the event of their presence in gasoline, they would probably occur in such small quantities as to be practically harmless.

Some History

However, Method 550.1 and its application is noticeable in Technical Paper 323-A, and subsequent issues, mostly because of its absence. This indicates no doubt, that the Interdepartmental Petroleum Sepcifications committee was becoming aware of the fact that the unsaturates were after all not to be worried over.

Still another item of interest—perhaps the term historical interest would suit best—is the discussion of aromatics and unsaturates in Technical Paper 214, "Motor Gasoline Properties, Laboratory Methods of Testing and Practical Specifications." The first issue of this valuable pamphlet by Dr. E. W. Dean appeared in February, 1919, which means very likely that some of the work of preparation was performed in 1918. So please note that even in the ancient time of the "dry bulb" and "puff of smoke" as the end point in distillation work, that Mr. Dean indirectly predicated the adoption by the industry and the public of the despised aromatic and unsaturated hydrocarbon. Mr. Dean probably voices the earliest widely read protective utterances, and extols the virtues of this relegated group of very important molecules, but all very discreetly.

Quoting from the paper (214), where gasolines are classified as: 1, "Straight refinery"; 2, "Blended casinghead"; and 3, "Cracked and blended gasolines"; we find in the discussion of aromatic hydro-

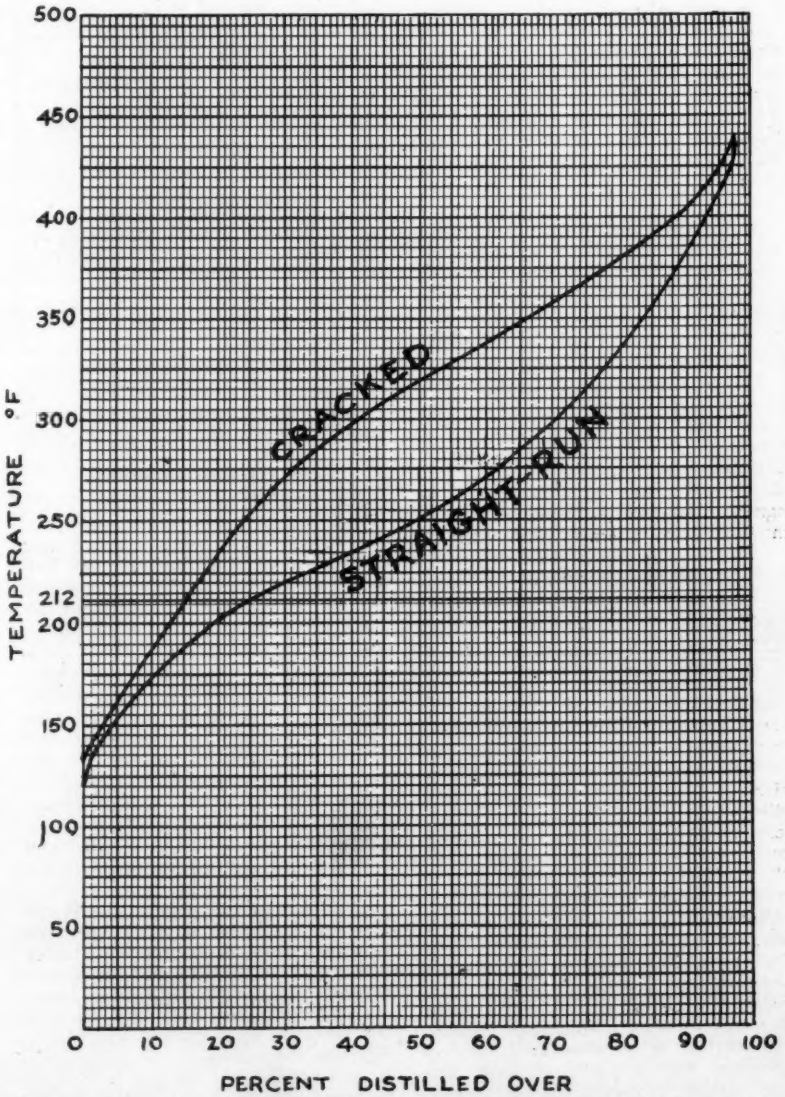


Figure 1—is illustrative of a cracked gasoline curve of relatively low gravity—53.7 degrees A. P. I. —the upper curve—, and a straight run gasoline curve, of 58.2 degrees A. P. I., the lower curve, both gasolines being derived from the same North Texas crude oil; and prepared during same day.

carbons that: "The utility of aromatic hydrocarbons as motor fuel has already been studied to some extent. On the basis of present evidence, these products, although chemically different from petroleum hydrocarbons, appear to have properties that give certain advantages in utilization. This problem merits discussion beyond the scope of the present paper. However, the evidence at hand indicates that if aromatic hydrocarbons appear in the American market as motor fuel in the future, users will be benefited." This excerpt is of interest, for though the benefits mentioned were apparent in the late months of 1918, almost eight years have passed before the aromatic is publicly acclaimed as "beneficient," instead of being of doubtful value.

With reference to the unsaturated hydrocarbons as discussed early in 1919, we find the following: "Another matter that has not been worked out completely is the effect of unsaturated hydrocarbons on the properties of gasoline. As already stated, there is conclusive evidence showing that gasolines containing moderate percentages of unsaturated hydrocarbons can be used with entire satisfaction, but it has not yet been definitely established that the presence of unlimited proportions of these constituents causes no disadvantage.

"In view of present market conditions it does not seem desirable to emphasize any requirements that may interfere with the development of cracking processes, as this now seems to offer the greatest possibility of conserving the country's petroleum resources."

Thus it is seen that the unsaturate is protected, and rightly, as research has found, and the aromatic is heralded as beneficial—away back in the early days of 1918 and 1919, when conditions in the refining and marketing industries in the matter of gasoline specifications, were so unsettled as to be termed almost chaotic.

Recent Discoveries

After the passing of some seven years, the technologists of the industry, through constant individual and co-operative research, discover the true properties of the olefin, naphthene and aromatic; find that they are responsible for the anti-knock qualities of certain non-detonating gasolines; find that their presence is conducive to higher efficiency of motor operation, and find that they present greater mileage capabilities, and that their utilization results in the deposition of much less carbon in the motor. In addition to the advantages present, and the laudable virtues of gasoline, containing these types of hydrocarbons, the research has pointed to the cracking process as the means of producing gasoline which in its inherent characteristics has the quality of being far in advance of straight run gasoline, in which the once all-important paraffin hydrocarbon is predominant. Synthetic gasolines, when properly prepared, have been proven by government test and experimentation to be superior to straight run gasolines. There are numbers of publications of discussions dealing with these types of hydrocarbons appearing in the current issues of the trade journals and elsewhere, by such investigators as Dr. Gustav Egloff, Dr. E. H. Leslie, Dr. Walter Cross, O. C. Smith, Roland B. Day, Midgeley, Boyd, Harry C. Ricardo, and others. It is interesting to note that in Mr. Ricardo's book, "The Internal Combustion Engine," the following statement is found: "It will be shown later that of the three leading groups of fuels tested the presence of the aromatics is the most of all to be desired from every point of view; that of the naphthenes next, while the paraffins are highly objectionable and the smaller the proportion present the better."

Thus the paraffin, though the head of the family for many years, is relegated to a place of secondary importance, and in fact, from the trend of most publications, it appears that the paraffin is now accepted in gasoline only because of the necessity of its utilization to supply the motoring public with sufficient fuel.

Usually the aromatic hydrocarbons when present in petroleum distillates prepared for the gasoline motor consist of such members as, benzene, toluene, ethyl benzene, xylenes, propyl benzene, mesitylene, pscudocumene and propyl xylene. They occur naturally in certain crudes and distillates in varying proportions, notably California, Texas and Smackover in the United States. Their empirical formula is $C_nH_{2n}6$.

California, Texas and Smackover oils, in the United States, also are derivatives of Naphthene hydrocarbons. The empirical formula is C_nH_{2n}, and such members as Cyclohexane, several dimethyl hexanes and trimethyl hexanes are found.

Anti-Knock Qualities.

The unsaturated hydrocarbons are the olefin series. The members generally present in cracked gasoline (not to any great extent in straight run gasoline), are Pentene, Hexene, Heptene, Octene, Nonylene, Decene, Undecylene, Duodecylene and Tridecylene. Although the olefins are of the same empirical formula as the Naphthenes, C_nH_{2n}, the chemical characteristics are very different. It is claimed that the olefin series or members thereof are less liable to knock, since they burn more slowly, and due to the fact that the pyrolytic conditions of temperature and pressure are conducive of their production, thus cracked gasoline, due to the presence of large quantities of olefins and others, is in reality an anti-knock fuel of high quality.

Cracked gasolines usually contain olefins and naphthenes in large proportions and lesser amounts of aromatics. Unfortunately the proportions occur in varying amounts with various methods of operating a given cracking unit. Also the various processes yield cracked gasolines of differing characteristics. It is impossible to give details as to the best process for the source of the better anti-knock fuel because of the absence of sufficient data and the inadequacy of present day apparatus and methods for the determination of the quantity of the various components, etc. Certain authorities aver that "vapor phaze" cracked gasoline is the better anti-knock fuel, even to the extent that it can be used to replace benzol in making anti-knock blends with straight-run gasoline. In addition it is stated that the vapor phase process yields small percentages of low-priced fuel oil, but is designed to produce a large volume, proportionately, of gas, which in some types of cracking plants is considered a loss, and from this gas, which by reason of its treatment and preparation is exceedingly rich in olefins and other reactive hydrocarbons, is produced by-products such as isopropyl alcohol, butyl, amyl, hexyl alcohols, etc., which in themselves are highly remunerative, and are also utilized as intermediates in the preparation of numbers of other high-priced chemicals. It is also claimed that vapor phaze cracking is high in cost, due to low through put, low conversion rate, and to the loss involved, for the loss is high unless the gases are utilized for the preparation of the above-mentioned by-products.

The liquid phaze cracking processes, such as Dubbs, Cross, Ellis, Jenkins, Isom, Burton, Holmes-Manley, Flemming, and others, are producing gasoline of high anti-knock value, as compared to straight-run gasolines generally.

These products, as previously mentioned, vary in their physical and chemical characteristics, and at present are in no way standardized, except in the usual matter of gravity and distillation range. Unfortunately no means has been devised for accurate determination of the proportional presence of anti-knock components. We cannot reach into the mixture, in the average laboratory, with imaginary grapple hooks and pull out selectively, the molecules or percentage of olefins, aromatics, naphthenes and paraffins present. The perfection and adaption of an accurate device or method, which is fool proof, and which can be used intelligently by the laboratory workers, is essential to the proper preparation of the highest quality of anti-knock, higher mileage, gasoline. The methods at present in use among scientific men are, it would seem, entirely too complex and intricate for everyday use and routine inspection.

Gravity Secondary

Along with the transition of unsaturates and other hydrocarbons to a place of importance from their past lowly classification, comes the departure from the use of "gravity" as a criterion of quality. Gravity has long been a false index to quality, due to the fact that any sort of gravity can be obtained by judicious blending. High test gasoline has meant little for years, despite the demands of the trade. Volatility has replaced it, and volatility is expressed in terms of the distillation range, which is often indicated by plotted curves. A curve indicating "Navy" speci-

(Continued on page 30)

Testing Tank Car Safety Valves By Air

Transcontinental Oil Company has its own device and complaints are less frequent

By Roye Munsell
Staff Representative

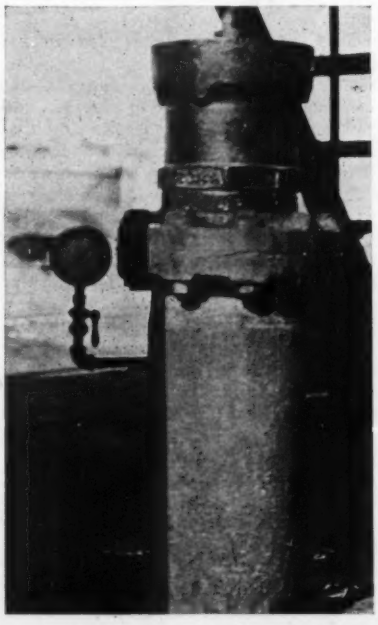
TANK car safety valves are not only sometimes a source of annoyance, but loss as well, when they do not function properly. They are frequently found to "blow" and leak gases in spite of the strictest compliance to the American Railway Association specifications and recommendations for testing and handling. Furthermore, they are exacting appliances. Safety valves must be tested at least once a year on Class IV cars and once in every two years on Class I, II and III cars. Care must be taken that cars nearly due for testing are not sent out on a trip that will catch them past due while on the road.

The Transcontinental Oil Company, operating some 1277 tank cars, after having the usual troubles with safety valves set about under the direction of C. H. McBurney, master car builder for the company, to see what could be done to make them less annoying.

Too Many Complaints

Complaints were coming in rather too frequently that such and such a car belonging to the company was found "blowing" at the safety valve while in transit. Such a conditions is not only against the "rules" but a source of waste as well.

Thorough investigation of these reports showed that the internal pressure of the tank cars reported did not actually exceed the 25 pounds, allowed by the American Railway Association and the Bureau of Explosive Regulations, and at which the safety valves were supposedly set to release.



Tank car safety valve air tester used by Transcontinental Oil Company at Bristow

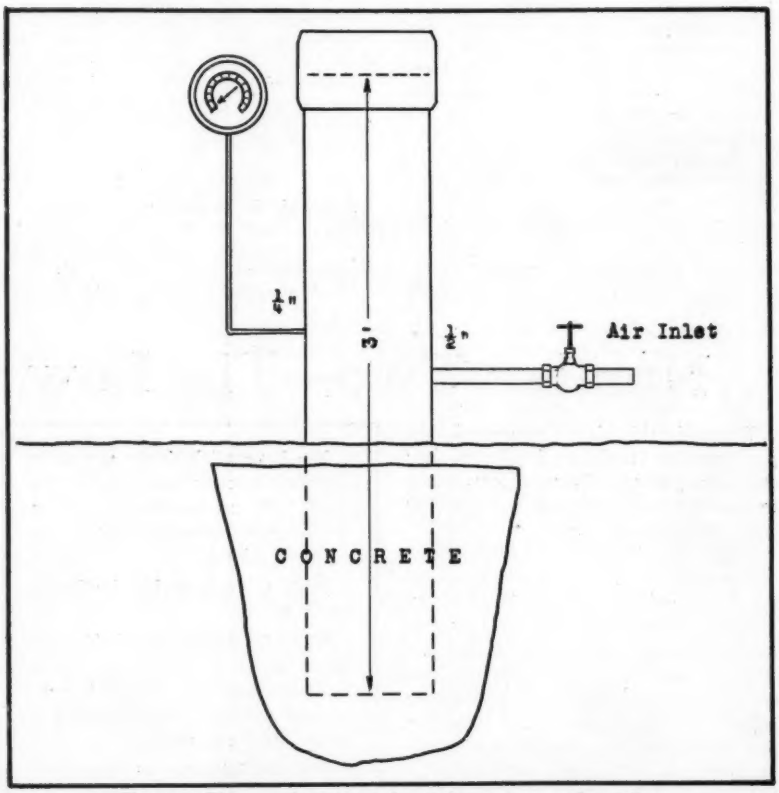


Figure 1—Diagram of apparatus for testing tank car safety valves

At that time the Transcontinental was using at all of their loading stations an approved A. R. A. Spring Tester. Checking the Spring Testers, however, against an air testing apparatus revealed that a valve spring set to open at 25 pounds with a Spring Tester may or may not actually do so in practice. A considerable variation above and below the 25 pounds was found in the actual air pressures that would open a safety valve that was adjusted with a Spring Tester.

How It Is Made

Therein, of course, was a source of no small part of annoyance and troubles from safety valves "blowing". They now use an air testing device instead of the Spring Tester at all their plants and have thereby eliminated all the difficulties of this nature.

Figure No. 1 is diagrammatic of the air testing device. They can be made, it will be recognized, at a very small cost and may be used by any plant having air or gas at more than 25 pounds pressure available.

The materials required are:

1. 1 piece of 7-inch pipe about 3 feet long and threaded at one end to receive a coupling.
2. 1 Standard or flanged 7-inch coupling.
3. 1 nipple ½ x 6-inch.
4. 1 ½-inch globe valve.
5. 1 nipple ½ x 2-inch.
6. 1 nipple ¼ x 4-inch
7. 1 plain ¼-inch ell.
8. 1 nipple ¼ x 12-inch.
9. 1 air gauge calibrated to at least 35 pounds.

The piece of 7-inch pipe is drilled and tapped for the ½-inch and ¼-inch nipples, respectively, at the places indicated on the drawing. It is then set into the ground at a convenient place with a bed of cement.

The inlet pipe is assembled from the

½-inch fittings and the air gauge attached by means of the ¼-inch fittings.

Air Best Medium

Either gas or air exceeding 25 pounds pressure may be used for testing but air is to be recommended for the sake of safety.

A valve to be tested by the Transcontinental Oil Company is removed from its place on the tank car and first dissembled completely and all parts thoroughly cleaned. The various parts are placed in a gasoline bath to loosen the rust and grime and then gone over with a wire brush.

As the valve seat is generally corroded, it is ground with Clover Leaf grinding compound until a perfect seat is secured.

After parts are cleaned and the valve seat reground, the valve is assembled and carried to the testing device and screwed directly into the 7-inch coupling for adjustment.

Although a variation of three pounds over and three pounds under is allowed, care is taken to set the valve so it will open at exactly 25 pounds pressure in the Air Tester.

Testing Valve Seats

Valves are further tested for any leaks at the seat. It is done by placing a cork in the drain hole of the valve cage and filling the cage with water. Eighteen pounds pressure by the gauge is then applied and if a seat leaks it can be readily detected.

After the valve has been thoroughly tested in the way described, and before it is replaced, a wire brush is used to clean the threads of the valve, and also those in the goose-neck of the flange on the car. Cup grease has been found very satisfactory to put on the threads since it makes them thoroughly tight and permits the valve to be easily removed when the time comes for testing again.

It will be recognized that more time is required to test a tank car safety valve in this way but the Transcontinental Oil Company has found the extra time to be more than paid for by the elimination of annoyance as well as losses traced to faulty safety valves.

Keeping Records

Although the American Railway Association recommends that safety valves be tested at least once a year and Class I, II continental has found that with their method a period of 10 months is very satisfactory for Class IV cars and 22 months for Class I, II and III cars.

Regulations say, however, the valves on Class IV or insulated cars must be tested at least one a year and Class I, II and III cars at least every two years. As a result of letters from Colonel Dunn to the effect that a particular Transcontinental car had passed a point with safety valves overdue for testing, Mr. McBurney devised a system to secure against such a circumstance.

A survey was made of all the company's cars and the safety valve test date of each one secured. A card system was then assembled with a card showing the test date of every car in the company's service. These cards were filed according to the months in which valves come due for retesting. At the beginning of each month with the aid of this file the men are notified just what cars will come due for testing during the month.

Since this recording system was installed, only nine cars have been tested by the railroads. These nine were caught only because the cars had been stored in the railroad yard at one of the plants and then moved to another plant without first coming to the loading rack.

Number Two—The Low Stage Circuit

We have all had our moments of laughter over the plight of the man, built on specifications of a lumberjack, who faints at the sight of blood.

He's a big man but he has a weak spot.

Now the equipment of the gasoline plant is like that. It is built for strength, line life, continuous operation and all that but it has its weak spots.

It's the business of the plant operator to know where his equipment is weak and to protect it.

While it may be well to laugh at the big bruiser with a weakness for blood, it is not good policy to take that attitude toward a compressor.

In his second article, Otto Peters takes up some of the weaknesses of the low stage side of the gasoline plant.

—The Editor.

We study this circuit as from intake gas scrubber tank, to intake of low stage compressor, through compressor to cooling coils, through coils to low stage accumulator tank.

Where the intake gas to low stage compressor is at atmospheric temperature, the volume of gas handled by compressor would be increased by precooling the gas, especially during the summer months, and when this is done we should be careful to provide a trap so that no liquids enter the compressor. The line from intake gas scrubber tank to compressor is usually in the form of a header so that more than one unit may be connected to it. It is good practice to have a recording gas meter located on this line to record all field gas handled by compressors to check against field meters, and much is to be thought of in laying this header as it is a large factor in making the plant flexible in engine operation. In circuit No. 1, we studied the gas constituents entering the plant, and in this circuit we have the compressor which instantly changes the gas from intake conditions to discharge and it behooves us to understand what takes place.

There is much to study on the compressor. We should first become familiar with its working parts, concentrate on the parts most troublesome and seek the cause of trouble. Proper lubrication is essential, insufficient lubrication speaks for itself, excessive lubrication is costly and apt to cause off-colored gasoline. One important factor often overlooked is the danger of water entering the compressor cylinder due to leaky gaskets, the compresssor is designed to handle only a gas, nothing as solid as water, this should be kept in mind as leaky gaskets are apt to cause serious trouble, especially when the cooling water system is of enclosed type where the pressure of water flowing through cooling jacket of compressor is greater that the gas discharge pressure. The trouble is most likely to happen while compressor is down, thus filling the cylinder with water. When in operation it may be indicated by gas escaping through water outlet of compressor or by excessive water in accumulator tank. When we realize the small amount of piston clearance allowed by manufacturers of compressors, the more need to be on guard against solids in the cylinder, even when making crank-bearing adjustments as they effect piston position.

The piping of the compressor should show as few fittings as possible, the more fittings used the more chances for leaks, particularly in the oil and water lines. The gas intake and discharge lines should be of proper size, the strength of fitting to be used is determined by purpose for which it is to serve, we have in mind the intake line is subject to atmospheric temperature and vacuum pressure and the discharge line is subject to temperature approximately 190 degrees F. and a pressure between 30 to 50 pounds. It is always good practice to pipe the compressor so it is easily disconnected. It is general practice to have a by-pass connection between gas intake and discharge line to facilitate putting compressor in service and it is important that the by-pass gate does not leak. It is necessary to provide a safety valve to eliminate danger of a closed discharge line, but there is a difference of opinion whether the safety valve should discharge into atmosphere or

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Treating Used Oil With Fuller's Earth

By Ismar Ginsburg

WHEN materials are plentiful and cheap, no one bothers about exercising economy in their use. There is no interest in methods for recovering them after they have been used, if this is at all possible. In our country, which has been blessed with great natural resources and what appeared to me inexhaustible supplies of many natural products which are essential to the progress of society and the furtherance of civilization, there has been but little tendency towards economy, at least in the past. That things have changed somewhat cannot be gainsaid. To-day we are not at all so sure that some of our natural resources have not been squandered, for there now appears on the horizon the possibility of seeing certain of these resources disappearing entirely in our own time. It is not intended here to refer to the much mooted question of the eventual depletion of our natural resources in petroleum. This is a matter than can be discussed from so many different angles and with as many conclusions that it would be, as we think, idle to undertake such a task. On the other hand it is a fact that the demand for petroleum products is increasing at a mighty rapid rate and what the oil men will have to determine in the very near future is whether or not they can continue to produce oil and refine it at a rate which is commensurate with the increase in the demand.

Nevertheless, it is true that the oil men of to-day are interested more than ever in the conservation of petroleum and petroleum products. As the demand for gasoline increases, and there does not appear to be any let up in this direction at the present, more and more of the higher hydrocarbons in the crude oil will have to be broken down, cracked, in order to give higher yields of gasoline. It is easy to understand that this must take place at the expense of the other petroleum products, the very important lubricating oils and oils used in the electrical industry, such as transformer oils and switch oils. If it is possible to devise simple methods whereby these oils may be conserved in use, then it is likely that a certain relief will be afforded. It cannot be otherwise but that the oil man will welcome such methods, if not now, then at least in the near future.

It is well known how lubricating and other oils alter as they are being used. They become diluted and contaminated with impurities of one sort or another and eventually they become no longer useable and have to be replaced. At times the replacement takes place quite frequently, and while the oil may be unsuitable for the purpose for which it was originally intended, nevertheless this unsuitability is not due so much to any change in the oil itself as to the impurities that it has dissolved or become mixed with during the operation of the machine. It therefore follows that if there were some simple and easy method for removing these impurities, a product could be finally obtained which could be employed over again as a lubricant or as an insulator in electrical machinery, at least in admixture with new oil, if not by itself.

Reclaiming Methods

Thus it appears that the whole matter hinges around the refining or purification process. The first thought might be to use sulphuric acid, which is the refining agent par excellence in the petroleum industry, but there are many reasons why the acid cannot be employed for this purpose. In the first place the initial requirement of a uniform product is missing, for the make-up of these used oils which are derived not only from the lubrication of machine, turbines, etc., but also from the insulation and cooling of switches, transformers, etc., is very varied. Then again it requires a great deal of experience to operate this process and furthermore the amount of material to be treated is small. All these mitigate against this process without mentioning the high cost of the same.

In the refining of mineral oils there are used adsorption means of various sorts in addition to the chemical refining agents. While the results that were obtained with the silicic acid gel treatment were unsatisfactory, those that were secured when the used oils were treated with Fuller's earth were on the other hand very good. One great advantage of the proposed treatment is that the use of Fuller's earth does not require any special technical knowledge.

Fuller's earth has been used for some time in the petroleum industry and the various conditions affecting the results obtained with it, such as duration of treatment, proportions of materials employed, temperature of treatment, and the loss in refining, have been known for some time, so that it is really unnecessary to go into any great detail here on these points. On the other hand the treatment of used oils with Fuller's earth introduces a number of new problems which are not present in the treatment of fresh oils but which nevertheless are of considerable importance and can well serve to aid in the application of this refining agent in the treatment of petroleum distillates in the fresh condition.

Uses of Fuller's Earth

The difference between the use of Fuller's earth for the refining of used oils and fresh distillates lies in the following fact. In the former case the Fuller's earth is employed to remove the considerable proportion of organic acids that are found in these products. Of course other degradation products both of saponifiable and unsaponifiable character are also removed. In the treatment of fresh distillates, on the other hand, the Fuller's earth is employed for the purpose of neutralizing the sulphuric acid which is present in the oils after the sulphuric acid refining operation, and also for the removal of the injurious asphaltic constituents and the small quantities of organic acids that are combined with them.

While the information that is given in the rest of this article, to which we are indebted in part to the excellent paper which appeared in Erdoel, 1925, number XXVIII, 10-12, is concerned mainly with transformer and switch oils, nevertheless it applies as well to lubricating oils of various sorts and particularly to turbine oils.

Attention is called to the fact that the attempts which have been made to remove the organic acids in the used oils with the aid of ammonium carbonate have not proven successful. The acids are only saponified and remain as such in the oil. The injurious ingredients are not removed at all. This also applies to treatment with magnesia. magnesium carbonate, aluminum oxide and similar chemicals. On the other hand the action of Fuller's earth is distinctly adsorptive. Saponification of the organic acids by the Fuller's earth does not take place and this is substantiated by the fact that after treatment the used oils do not show any or else a mere trace of ash.

It must also be remembered that the character of the Fuller's earth employed has a lot to do with the results that will be obtained.

A series of experiments were carried out on this subject as reported in the paper referred to above. The oils were placed in a suitable beaker and stirred vigorously with the addition of the Fuller's earth. The various physical and chemical constants of the oils were determined both before and after treatment. The most characteristic factors was the acid number. The tar number was established in just a few oils. It was found that the tar number goes hand in hand with the acid number and that there were

no used oils which possessed high acid numbers that did not have correspondingly high tar numbers. The oils were admixed with about ten percent of Fuller's earth and then the mixture of oil and the earth was stirred for a period of one hour at a temperature of 100 degrees C. Then the used earth was filtered off.

More Earth Less Acid

When the acid number was determined it was found that the treatment with Fuller's earth had the effect of removing a part of the acid substances that are contained in used oils of high acid number. Then the tests were repeated with the purpose of determining what effect would be produced by employing greater quantities of the Fuller's earth. The percentage of the earth was increased from zero to fifty percent. This oil was a particularly bad one as far as acid ingerdients are concerned. It was found that the addition of more earth had the effect of reducing further the acid number of the oil, thus showing that the acid ingredients are progressively removed by the Fuller's earth. However it must be concluded that while these results are interesting, they are not of any great commercial value for the reason that it would not be feasible from an economic standpoint to employ such large quantities of the earth.

The next series of tests was made for the express purpose of determining the effect of temperature on the refining operation. An oil which had an acid number of 1.4 was treated at temperatures which varied from 20 degrees C. to 200 degrees C. for the same period of time and with the same proportion of Fuller's earth. The interesting fact that was revealed by the experiments was that it is not necessary to raise the tempertaure in order to secure effective action of the earth. Thus it was found that the number of milligrams of potassium hydroxide solution, which means the acid number, that were required to neutralize the acidity of the oil, treated at a temperature of 20 degrees C. was 1.1. At a temperature of 40 degrees C. this had dropped to 0.95, and when the temperature was increased to 120 degrees C. the acid number became 0.88. Thus it is clear that the rise in temperature is but little effective in facilitating the removal of the acid ingredients by treatment with Fuller's earth, and it is just as well, and more economical, in fact, to carry out the operation at a temperature of 40 degrees C.

The next series of tests was made for the purpose of ascertaining what effect the quality or peculiar properties of any one grade of Fuller's earth had on the refining process, and whether or not one grade was any more effective than another. Quite a large number of grades of this mineral were employed in these tests and they were employed in treating different gardes of used oils. In other words the conditions were varied as much as possible so that the effect of the different varieties of Fuller's earth on oils containing little acidity and those containing large proportions of acidic substances could be determined. Thus one oil had an acidity of 0.32, another an acid number of 1.4, a third an acid number of 1.8 and the last one an acid number of 2.1. All the tests were carried out at a temperature of 100 degrees C. and the oil and filtering medium were allowed to remain in contact with one another for a period of one hour.

Results From Experiments

The various grades of Fuller's earth were designated by numbers and the lowest number was chosen as the most expensive. Some of the results of these experiments are shown below in tabulated form.

	Acid Number
Oil with acid number equal to 0.32	
Fuller's earth—	
No. 1a	0.11
No. 2a	0.14
No. 1b	0.08
No. 4b	0.02
Oil with acid number equal to 1.8	
Fuller's earth—	
No. 1a	1.1
No. 2a	1.25
No. 1b	0.84
No. 8b	1.25

These results bring up this important point, and that is that while it is true that the most expensive types of Fuller's earth are the ones that possess the greater bleaching power, nevertheless, as far as the adsorption of acid ingredients is concerned, this property is not of any predominating importance.

Electrical Properties

While it is a fact that the yields that are obtained in this process as it is carried out in the laboratories cannot be applied to large scale operations, it is how-

(Continued on page 36)

How the Skelly Shop Cleans Tank Cars

Aluminum paint requires special acid mixture with water while inside must be scraped

By Grady Triplett

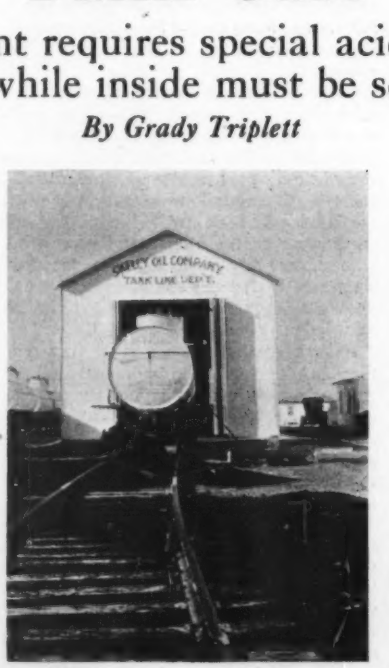
CLEANLINESS is not all there is to putting a tank car in shape for the road. But cleanliness is no small part of the process a tank car of the Skelly Oil Company goes through when it comes into the shops at Tulsa.

The policy of the tank line department is to get a car into the shops each six months for an inspection, with repairs to be made according to needs. And a thorough cleaning is part of the work involved in this process.

Recently the Skelly Company adopted aluminum paint for its tank cars. Keeping them clean became a problem, for this light color leaves dirt and grease to show to greater disadvantage than darker colors.

A thorough cleaning in the Skelly shop means work inside the car and work outside the car. It is work by hand, as well as by machinery.

When a car, or a string of cars, comes in, the inspection is made by



The entrance end of the repair shop

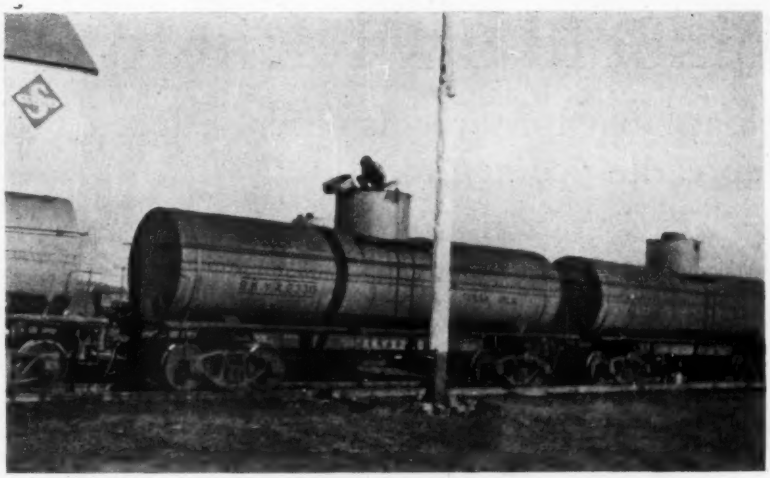
F. W. McGrath, tank car foreman. He examines all working parts and then assigns a man to the work—several men, if the job requires it.

First the dome covers are removed and outlet valves opened, to give the car a chance to rid itself of gases. Unless there is special need, no one is sent inside the car at first. Where a man must enter a car just after the dome cover has been removed, he must use a gas mask and be supplied with fresh air.

After a car is free of gas, it is ready for cleaning inside. Water, wire brushes, scraping knives and drying rags are necessary for this.

First a water hose and wire scrubbing brushes are taken inside the car. The interior is flushed with water and as much foreign matter as possible is removed with this, being permitted to drain out through the bottom openings.

But this sort of cleaning will not remove all line rust. So scraping knives,



Removing the dome cover, the first move when the car reaches the Skelly shop. Another man is opening outlet valves

such as are used to remove paint, are called into play. Workmen go over the whole interior of the car, scraping away the rust and other material from around rivet heads.

Then the car is flushed again. If inspection shows still more rust around rivets and in crevices, the process is repeated. The work is kept up until the interior of the car is clean. Then rags are used to wipe down the walls. The car is not left until it is dry.

Frequently half a barrel of line rust will be removed from the interior of a tank car after this fashion.

Very soon the intention is to try a solution of water with caustic soda for washing down the interior walls of a car, as it is believed this will help to remove more of the rust from around rivets, thus eliminating some of the work of scraping with knives.

Cleaning Outside

With aluminum paint, outside cleaning differs from what is necessary with black paint. Dirt and grease must be removed but the paint not damaged. So the Skelly company mixes its own washing preparation.

Amounts of the ingredients are varied to meet conditions on a tank car. Ordinarily three pounds of acetic acid, with 12 pounds of oxalic acid, are mixed with 50 gallons of water in a wooden barrel, thus forming an excellent mixture for removing grit from the outside of an aluminum-painted tank car.

For cleaning purposes, this mixture is taken in a water bucket to the running board of a car. here it is applied with a scrub brush, the whole surface being covered. After that water from a hose is used to remove the loosened dirt from the sides of the car.

This method has been found satisfactory for cleaning tank cars of aluminum color.

Testing Valves

Another function of the car shop is to test all safety valves. The safety valves on each car are removed and ground for seating, being then tested for pressure of 25 pounds. If the valves can not be ground by using a compound while they are in place, they are ground with a compressed air machine, designed for the purpose.

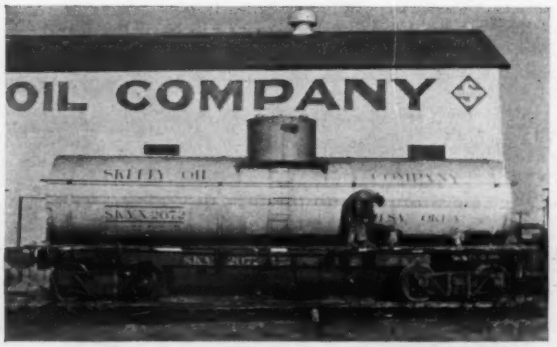
Testing is done on a test block, pressure being provided through compressor.

All stud bolts and eye bolts are inspected and any defective ones put in condition before a car leaves the shop. All bolts on a car are tested and tightened. These include safety appliance bolts. Where necessary the bolts are renewed.

Journal boxes and journal brasses, as well as packing, are inspected. Oil is renewed where necessary.

The Tulsa shop is equipped for making some heavy repairs but its chief function is to keep the rolling stock in operating condition through maintenance methods.

Giving a string of cars the first course, just after arrival.



Cleaning an aluminum-painted tank car

New Agent for Griscom-Russell

Griscom-Russell Company has just appointed The Thomas Machinery Company, 622 American Bank Building, Los Angeles, Calif., as their Pacific Coast agents for G-R products designed for the petroleum producing and refining field only. The Griscom-Russell products to be handled by the Thomas Machinery Company include the new G-R Bentube Section, a type of self-scaling atmospheric cooler which has recently been developed, the G-R Gasoline Condenser, the G-R Twin Multiwhirl or Vanedo Exchanger, the G-R Mineral Seal Oil Heat Exchanger, the G-R Vaneflo Gas Cooler and the G-R Jacket Water Cooler.

Bulletins describing any or all of this apparatus for the petroleum producing or refining trade can be obtained by writing The Griscom-Russell Co., 285 Madison Ave., New York, or The Thomas Machinery Co., American Bank Building, Los Angeles, Calif.

Chas. C. Moore & Co., will continue to handle the sale of all Griscom-Russell products to all Pacific Coast trade excepting oil refining and producing companies.

Keeping Men Sold on Their Jobs

In the Marland plant labor turnover has been reduced by spreading contentment

By Grady Triplett

TO GATHER an impression of how the Marland Refining Company deals with the employment problem it is but necessary to sit for the better part of an afternoon in an anteroom adjoining the office, where that department is housed. In this office only the refining plant is considered.

Other departments may have similar duties. But the plant differs slightly in that its workmen are confined to one small space. The producing department has its employes scattered, just as sales and service employes are in scores of localities.

The one impression that will come from a few hours of listening in the refinery employment office is that the company makes a personal matter out of each man's job. Theer are, of course, details, plans and system. But these are the background. The visible part is that of the men coming singly, in pairs and often in groups to take up matters that are of prime importance to them.

One at a Time

Each gets a hearing. The door is open always. Each man knows he will have his turn. If he does not have time for stating his case during work hours, he knows he can come back after hours and find the office open.

There is another impression, too. This department is in charge of R. R. Zimmerman, whose title is refinery employment manager. The impression after watching him for an afternoon is that he loves his job. If he does not, then love for a job never existed.

There were a dozen or more men in and out of his office while this writer waited, giving up his turn in order to gain the advantage of listening and watching. To relate some of these conferences will give a picture of the workings of the department and not betray any secrets.

One lanky lad entered and there was a bit of conversation, after which a telephone call to the insurance department asked if it would be possible to push the case of this man ahead of its regular turn in order that he might have some money for Christmas. Then he was asked to visit the company clinic and then to call back.

Later it came to light that this man had worked just two days and had been confined to his home with illness. As each employe is insured the day he goes to work against illness, he had some money coming. His plea, or one of them, was money, so that request had been made.

A Personal Matter

Then came evidence of the efforts that will be made just to keep a man satisfied with his job. After this man had been released from the physician's office, he called back by telephone and Zimmerman asked him to wait at the refinery gate.

There followed a visit to his home, or rather to the house where he had undesirable rooms at a rental higher than his capacity to pay.

Next Zimmerman took the man to some houses the company has built in its effort to relieve the housing situation in Ponca City. One of them looked good to the workman. Incidentally the rent was less than half of what he was paying for basement space in a home.

But the matter did not rest there, for the man had no furniture for setting up housekeeping. So next came a visit to a dealer in hardware and furniture, where credit was arranged and a few utensils bought.

Day and Night

These and the man were delivered back at his living quarters, where arrangements had to be made for him to vacate that night. The company, through its representative, took responsibility for the sudden move and the house owner was satisfied.

But the move had to be made. So arrangements were made to have one of the company automobiles attend to moving the family and its clothing. Another automobile was called to the office to take some tables and chairs, now in use, so they could be set up as part of the household furniture in the new home.

Half of an afternoon was spent in caring for that employe, in order that he might have better and cheaper living quarters and be back at his job the next morning.

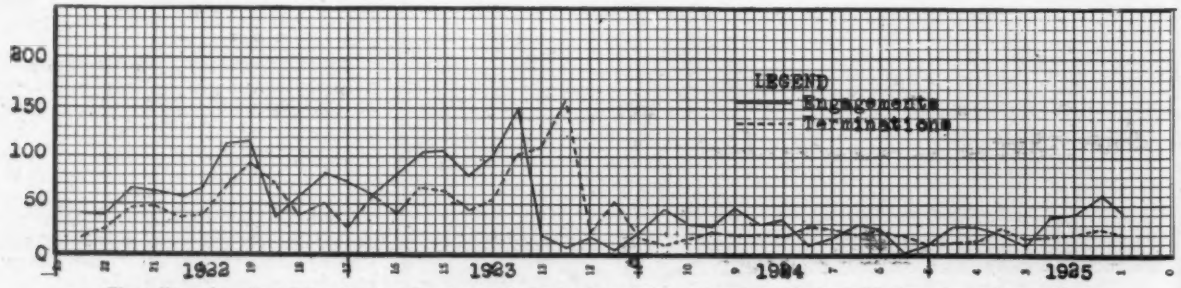
The efforts put forward in behalf of that man include the greater part of the methods by which the Marland Company deals with its workmen.

Before a man can go to work, he must have a physical examination. That is attended to by the company physician. When he goes to work he is insured against sickness, this assuring him of three-fourths of his wages for the period he is not on duty on account of illness.

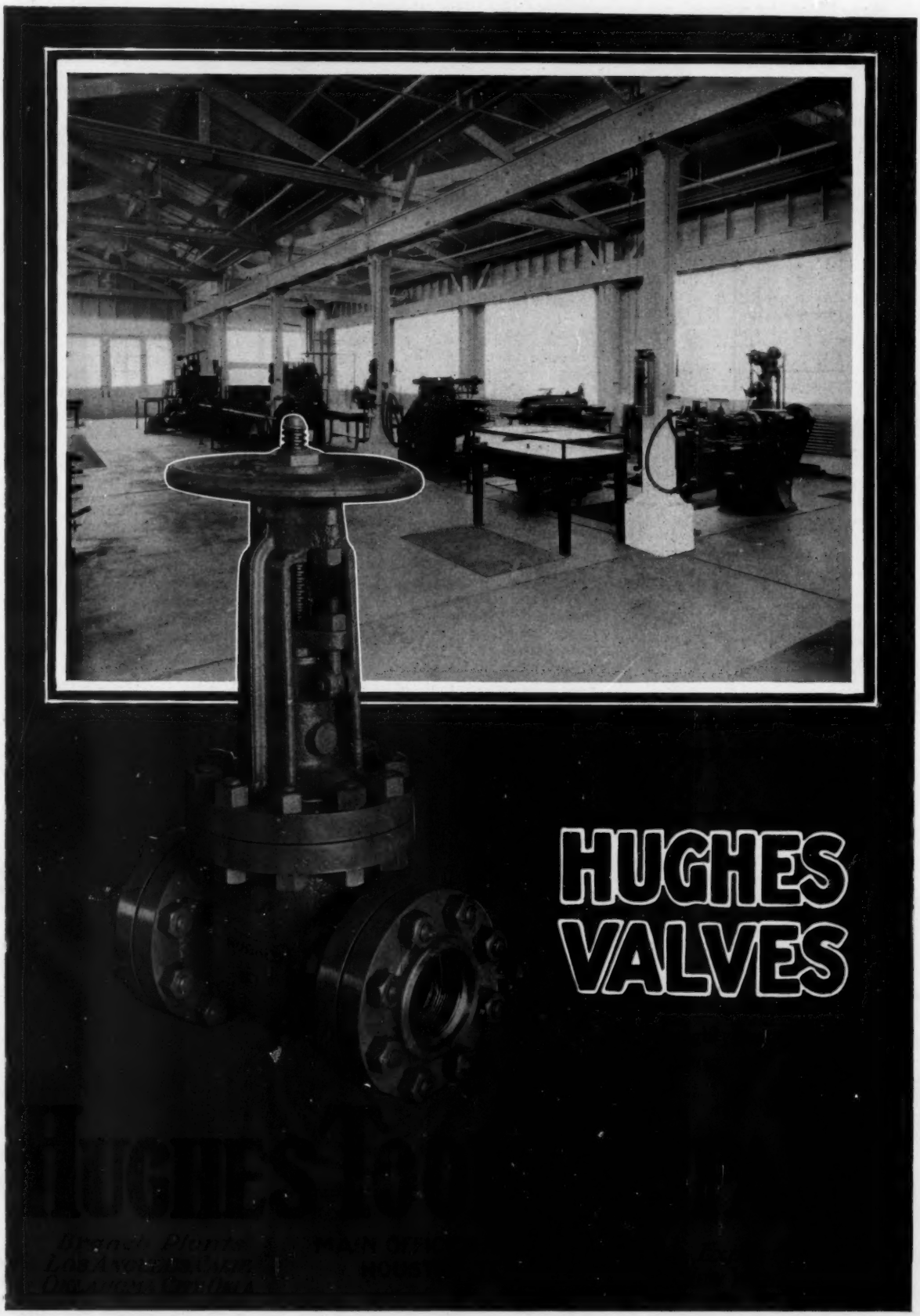
At the end of 90 days of employment each employe receives a life insurance policy of $1,000. At the end of a year this amount goes to $2,000. It is increased $1,000 at the end of each year thereafter until the policy reaches $5,000.

Buying Contentment

All costs of the insurance are borne by the company. But this insurance is not looked on as charity. The purpose behind it is to leave a man satisfied to do his work. Executives of the company believe a man is a better workman when he knows illness is not going to deprive him of income and when



These lines show how labor turnover has been reduced in the refining plant of the Marland Oil Company at Ponca City.


HUGHES
VALVES

he knows his passing will not leave his family without funds.

So insurance is just an investment in contentment for workmen.

Another road to assuring contentment is provding living quarters for men and their families. In the case of this man, rather extreme pains were taken, attended with a little effort, but it was an extreme case.

In just one particular, this case was not typical. It is not the policy of the company to hire men just because they are in need of work and out of money.

"But that man will pan out," is the way Zimmerman explained his reasons for spending so much time in seeing to the wants of the man. "He will make a good workman and earn promotions."

If he does not, then gratitude is being squeezed out of human beings.

Bringing a Friend

Here is another little incident of the employment office. A young workman came in, accompanied by another youngster, whose white collar stamped him as not a plant workman. The workman wanted a job for his friend. Zimmerman talked it over with the two, but the applicant got no work.

"You get out and do some outside work and build yourself up physically," was the advice as the two left.

But that young man left knowing he may have work with the Marland company provided he can bring himself to the physical state demanded by refinery work.

That incident brings up the method by which workers are recruited for the Marland organization. The bulk of new men come recommended by present workers. That condition has just come about without any effort on the part of the company to inaugurate it.

But it is a desirable condition. When an employe brings a friend who wants work, the company has some estimate on the sort of man making the application. It is sound reasoning that an employe is going to recommend a man of his own stripe. So a recommendation by an employe means something for the man wanting work.

How to Find Men

Promotions in the plant organization come frequently through such methods. One man came in with a relative, who had joined the ranks of the plant's common labor. The relative, already out of the common labor class, thought the new man could do work that would bring higher pay. He asked that it be given consideration and it was.

Frequently men write from other cities, saying they have been advised to do so by some man in the organization. Scores of these later find employment.

Just now the Marland company is working 1200 men, due to work of enlarging the plant. This is twice the number formerly at work. But this working force was recruited without advertising for labor, other than a few of special training and craftsmanship. The greater number of 600 additional men were employed through recommendations within the former organization and from the publicity the building program had through news articles.

A Rough One

But all conferences in the office of the employment manager are not of the pleasant type. One man came in with a snarl. He sought to enter ahead of those waiting longer than himself. But he was asked to take his turn and did so impatiently.

His presence was due to a clash with his foreman in the morning. He had quit and had not failed to express his opinion of his foreman, his fellow workmen and the company. Now, however, he was somewhat repentant.

After a short talk, he was offered a place on the yard, where his work would be outdoors. At that he sulked. But it was all that was open. He was told that he had lowered himself in the eyes of his foreman and the other workmen of the department. So the only thing that could be done was to let him start a little lower down the ladder, with a chance to work up again.

Finally he accepted. But he did that reluctantly. He was of the sort that is not easily satisfied. Unless he changes his methods he will work himself out of the organization and cease to cause trouble there.

Hour after hour during six days a week, the employment office handles these cases. No two are identical. But there is likeness in most of them. Men seem to prefer to tell their troubles and their joys. The department furnishes a place.

That is not all it does by a great deal. It must keep the plant supplied with labor. It must keep records on all employes. It must look after promotions. There are scores of details that must have attention each day. But none of this is allowed to interfere with the business of satisfying the wants of the men.

Helping Home Buyers

One man came in to inquire about owning a home. From a brief conversation it was revealed that he had obligations which made him a risk at paying for a home. But he left satisfied, for he was told to clear up some other obligations, so he could be recommended as a home owner.

The scheme of allowing workers to buy homes without making a "down payment" has just been adopted. Men, when recommended by the company management, can become home owners by paying just one monthly payment on a home and assuming the obligation of paying the whole cost.

In this the Marland company has used its offices with those of a building and loan association in Ponca City. First executives of the company must be convinced of the stability of the man and his financial condition. When those meet approval, he is recommended as a home buyer. The building and loan association allows him to take up the obligation on just a monthly paying basis.

But the Marland company backs the venture until the individual has paid 10 per cent of the total obligation. After that the transaction becomes one between the individual and the building and loan association.

In the matter of wages, the Marland company pays slightly above the common figures. This applies to "common labor" as well as to skilled labor.

All these efforts are on the expense side of the ledger, so to speak. They represent what the Marland company does for its men. Since it is not the purpose of the company to accomplish charity, it is a just question to ask, "What do the men do for the company?"

One concrete answer to that can be had by glancing at the labor turnover graph, shown herewith. Industry for many years has been seeking to reduce labor turnover. There are varying figures as to the cost of hiring a man. Certainly $30 is low enough.

Reducing Labor Turnover

Figured on that basis, the maintaining of a labor department has accomplished a material saving to the company. Whether this saving offsets the cost of the several things the company does for the men cannot be here answered, since the cost of these items is not known.

But there is something else on the side of what the men do for the company. It is not possible to put this in figures. But students of labor are agreed that a satisfied worker does more work than a dissatisfied one. So the Marland company must gain part of its expenditure on that score.

Another possible return is the satisfaction of knowing that men have had a square deal. But that comes near to the dividing line between business and charity.

Labor turnover in the Marland plant has not been reduced solely by doing creditable things for the employes. But the reduced turnover has come about through the working of the employment department.

Before the creation of this department in September, 1922, it was the custom of this company to hire extra men whenever the need arose. Some special work for a few days meant recruiting labor for the work. There was no co-ordination of the labor needs of the plant.

Now all employing is done through the department maintained for that purpose.

How It Works

Here is an example of how it works and how it reduces labor turnover. When labor is needed, the need is carried to the department. But instead of

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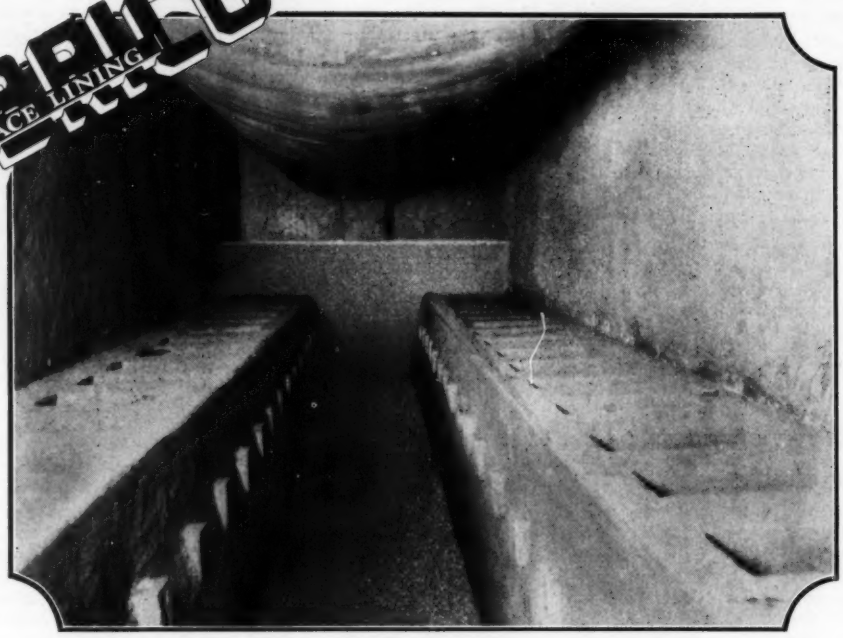

A Plibrico Diffusing Furnace under Schulze Process still at the Red River Refining Co. Note how easily doghouses are constructed with Plibrico.

"Our furnace troubles are over"

—R. S. Watt, Treasurer, Red River Refining Co.

AT the Red River Refining Co., Burnham, Illinois, firebrick linings under stills and boilers had proved short-lived. They tried Plibrico; now they use it altogether.

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Plibrico Furnace Lining outlasts firebrick many times. It has no weak joints. It's plastic. Any one can install it. You pound it in with a mallet—trim it with a trowel. No skilled masons needed. No stocking of special shapes; plastic Plibrico is ideal for door arches and other special shapes.

You can use Plibrico for repairing, too. See how it outlasts the firebrick around the repaired section. Use it under stills or under boilers.

One of the Red River stills being lined with Plibrico

There's a Plibrico warehouse and a Plibrico service engineer near your refinery. Check the coupon if you'd like a man to call to estimate on your relining or repairing.

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seeking men for that one task, the first move within this department is to see if men already on pay rolls can not be shifted to the construction.

Often labor will be needed for a Wednesday morning. By consulting records, it may be learned that some men will be released Friday unless work can be found. A consultation between department heads may reveal that the contemplated construction can be held up until Friday.

So instead of hiring a temporary force Wednesday and dismissing another one Friday the one already at work will be carried over, the work being held up for two days.

It requires system, thought and effort to reduce labor turnover. All are employed to that end in the plant of the Marland Refining Company.

This may bring forth the criticism that the Marland company is larger than the average refining concern, and because of its size can do these things. It seems just as logical to turn that around and say that a concern is large because it does certain things, rather than that it does certain things because it is large.

No small concern can attempt a scheme as pretentious as that employed by a larger concern. It may be better to state that no small concern should attempt such.

But there is nothing in the Marland plan that can not be modified to fit a concern of any size.

Now if a personal observation is in order, here it is. No labor problem can be handled until a proper man has been found to handle it.

R. R. Zimmerman happens to be a man who likes that sort of work. He trained himself for it. But he did not find a department awaiting him within the Marland organization. He was in the department of insurance for a time.

Finally the position of manager of the refinery employment department was created. After that he had to work out his methods and put them to work. His department is still growing.

It will continue to grow, for he loves his work. Otherwise he would never spend part of an afternoon and part of an evening just to see that a laborer had a better and cheaper place to live and some money for Christmas.

Unsaturates, Aromatics and Naphthenes Changes

(Continued from page 18)

fications is considered representative of good gasoline, with no regard for gravity. A low gravity gasoline, such as produced by cracking, of the proper volatility, may be very low in gravity, in fact should be, for the low gravity indicates the presence of the desirable anti-knock, powerful, slow burning, aromatic, naphthene and unsaturate. A gravity scale of below 50 to 55 degrees A. P. I. may soon take its place in market quotations, indicating that the gasoline is of better quality than the 56 to 68 gravity straight-run gasolines also quoted, and the lower gravity product being probably a cracked or synthetic gasoline, perhaps at a higher range of prices, say a "Newer Navy" gasoline.

Distillation Record.

St. Run Gasoline		Cracked Gasoline
582	Gravity	53.7
120°F	I. B. P.	126°F.
172	10%	182
203	20%	232
218	30%	270
234	40%	297
250	50%	317
270	60%	335
296	70%	355
329	80%	377
380	90%	400
405	95%	416
435	End Point	439

Among the problems confronting the refining industry is that of securing color and odor specifications. Odor is in itself meaningless and indefinite. Certainly cracked gasoline has a different odor than straight run, but that is indicative of little or nothing. That cracked odor so often objected to should be welcomed as it is indicative of other good qualities of the gasoline. One means of changing the cracked odor, where such steps seem necessary, consists of adding a small quantity of naphthaline flakes to the gasoline. Naphthaline flakes will change the odor, but whether it actually improves it or not is still another question. The value, however, of naphthaline as a motor tonic has been consistently and conclusively proven, but why add anti-knock dope to a very good anti-knock fuel, as crackel gasoline is certainly that kind of fuel.

Of course, where the odor of hydrogen sulphide is found in cracked gasoline, the product can be greatly improved by an inexpensive alkaline wash. Certain gasolines are in need of such cleansing.

Color Difficult

Color, on the other hand, is still a problem. Certainly it is cheaper to market the products of the "crackers" as such and with its yellow tinge, or even to color it some popular shade of red, green, orange, etc., as is practiced to some extent. The treatment of most cracked distillates to permanent colorlessness is, as a rule, an expensive procedure. Usually much experimenting is necessary to secure the desired results, and although it it possible to treat to stable color, the best practice involves certain volumetric or treating losses, in addition to the expense of treating labor and chemicals.

The action of acid upon the unsaturated, and aromatic, and the naphthene hydrocarbons is well known. A certain proportion of them are absorbed, polymerized, and reacted upon, and lost. Dr. Gustav Egloff discloses the startling estimate that "there is a loss of over 125,000,000 gallons of cracked gasoline due to acid treatment of cracked distillate." This, of course, represents a ponderable sum of money when figured with the price of gasoline—not to include the cost per barrel of treating the distillate to obtain such disastrous results.

This loss, the industry suffers merely to obtain a water white, sweet smelling gasoline, and at the same time reduces the efficiency of the gasoline by extracting whatever proportion of unsaturates, etc., is removed or destroyed by the acid treatment. There are certain treating methods lately devised and perfected which perform satisfactorily—some without the use of acid, others involving but small quantities of it, which are highly successful, and also highly secret. Possibly, after two or three years of patent office procedure, some really good treating method, device or procedure will be marketed publicly, which will give with economy, the desired stable color, etc., but in the meantime the industry either struggles along under the burden of high acid and treating losses and costs or the treatment in pressure distillate is abandoned entirely. The latter possibility is the better solution, even though the education of the public to use off color gasoline (at a premium) may be slow. It appears to this writer that "costs" or "loss" will be about the same to the industry as a whole. The fact that the motoring public is apparently willing to accept education seems to point toward the marketing of untreated or more lightly treated cracked gasoline. Certain gasoline, of course, will of necessity require treating. Gasoline containing any material percentage of the diolefins, such as Isoprene, dimethylbutadiene and others, which group by the way, is now the recipient of the refiners' wrath, will require acid treating probably. The diolefins are objectionable because of their instability, which is conducive to their formation of gums or resinous substances, giving the gasoline that discouraging faculty of going off color in storage and sunlight. Acid treatment effects the polymerization of the diolefins to tars, to be removed with the sludge. Thus the problem remains—to select the diolefins for destruction, but to spare the olefins, aromatics and naphthenes. The paraffins will care for themselves.

The unsaturates then are changing complexion, or have done so, along with the aromatics and naphthenes and they are rapidly becoming necessities toward the formation and production of quality gasoline, and in numbers of instances their presence in motor fuel is conducive to increased price; for premium prices are being demanded for cracked gasoline by numerous large companies who advertise their synthetic gasoline almost nationally. Is there any doubt but that the day of the cyclic and unsaturate has come?

As reference in the preparation of this discussion the publications of the authors mentioned herein have been used.

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Colloidal Chemistry of Petroleum Refining

By Ismar Ginsberg

IT is not so long ago that colloidal chemistry was studied by scientists who had no idea whatsoever of applying its principles and the results of their studies to practical chemical operations. It was a science, a part of chemistry, which was not taught in the technical schools, because of the fact that it was not understood or appreciated from the practical viewpoint. Today, we find colloidal chemistry playing an important part in chemical industries and in the allied industries where chemistry enters into the manufacturing process. Colloidal chemistry is today probably the most important and most potential branch of chemistry for many reasons. There are a great many chemical operations that depend for their proper understanding on a thorough knowledge of the principles and practices of colloid chemistry, and there are many products which are colloidal in character and which when handled or processed in the plant involve the use of methods which are of a colloidal character. Thus the substance rubber may be mentioned as one of the most important industrial colloids and of course there is petroleum which is also a colloid.

It is understandable that unless the principles, the theory of a science is understood it is not possible to obtain good results from processes that depend on the practical application of these theories and principles. In handling substances such as rubber and petroleum it is not possible to obtain the highest efficiency in the processing to which they are subjected unless the science of colloid chemistry is thoroughly understood. Results which are otherwise obtained are empirical in character and have been worked out purely by the rule-of-thumb method, and it is apparent that they cannot be thoroughly correct. The only way in which to improve the process is to study it from the theoretical side and apply the sound reasoning of the scientist and the theorist to practice. It must be remembered that the most practical thing is after all the well founded theory or principle, and the application of such principle to the problem of winning, refining and preparing petroleum depends on proper understanding of the fundamentals of colloid chemistry.

For it must be remembered that petroleum is a colloidal solution and the difficulties that are often met with in the processing of crude oil are due to the properties of the colloid, particularly to its tendency to form emulsions with water and other aqueous solutions. Petroleum is not soluble or miscible with water or water solutions and emulsoids, as they are more scientifically called are formed. The importance of understanding the colloid chemistry of petroleum is emphasized in this connection that it is possible by the application of other colloids and colloidal solutions to remedy these difficulties.

Start at Well

The colloidal troubles, as they may be called, of the oil man start at the well itself. There the colloid, crude oil, is given a chance to admix with other colloids and the result is the formation of colloidal mixtures of water, oil and clay which are found to be very difficult to separate into their respective ingredients. Colloidal clay is of course often found in the well and in the removal of the oil from the oil sand, it is impossible to avoid a churning up of the oil and clay with the result that a very permanent emulsion of clay and oil are formed. This is probably one of the most troublesome emulsions that are formed in the oil fields and all sorts of remedies have been provided for destroying it. They all depend on the addition of a chemical which serves to coagulate the very fine particles of clay. Any metallic salt which is highly soluble in water or which gives an acid or alkaline reaction when dissolved in water will have some beneficial effect on the emulsion. For the principles of colloid chemistry teach us that a colloidal emulsion will not exist in the presence of dissolved electrolyte.

Another emulsion that gives considerable trouble in the oil fields is formed by the solution of gases, coming from the oil well, in the oil itself. Thus for example minute particles of carbon dioxide gas or methane gas may be dispersed through the crude oil to form an emulsion which it is very difficult to destroy. It has been found that the greater the viscosity of the oil the more troublesome the emulsion will be and the more difficulty will be found in breaking it down.

Still another cause of emulsions at the oil wells in the fields is the presence of asphalt in the oil. This along with the mineral matter that is also found in it forms a protective covering around the particles of waters and produces an emulsion which it is really very difficult to break down.

Present Methods

There are really a large number of methods of more or less effectiveness which have been proposed for breaking down these emulsions. But all of these methods can be classified under five separate headings. The first general class of methods involves the addition of a de-emulsifying agent of some sort. Various substances are used for this purpose and there does not seem to be any limit to the number that can be located and advocated, as solving this problem, no matter how ineffective they might be. Often these substances are nothing more than a water soluble soap and at times the main ingredient is nothing more than ordinary soda, sodium carbonate. Compositions are also freely recommended for this purpose. These will at times contain a sodium soap, sodium oleate for example, mixed with small proportions of sodium resinate, water glass (silicate of soda), phenol, paraffin and water. When these soap preparations are dissolved in water a hydrated colloid is formed which is not soluble in oil. The use of sodium carbonate simply involves the formation of the sodium soap right in the mineral oil through combination of the soda with the fatty acids that are present in the crude oil. Various sulphonated oils may also be employed for destroying emulsions. These include sulphonated stearic and palmitic acids, gelatin and starch.

The second general method is the use of a filtering machine. An ordinary filter press may be employed for this purpose as well as filters of special design. In the former case a very fine filtering medium is employed and this is supported on the cloth on the filter press leaves. This filtering medium serves to eliminate the fine solid particles, such as clay and asphalt, and when that is done it is found that the oil and water will separate without any further trouble.

The third class of de-emulsifying methods is the electrical. This implies the use of the electric current which is made to pass through the emulsion. It is claimed that the minute particles of water in the emulsion will follow along with the current and that either alternating or direct current may be

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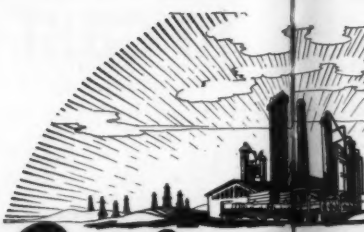

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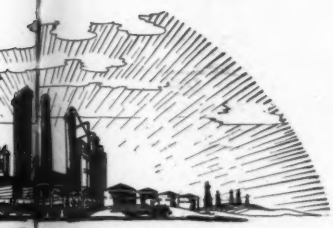

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employed for this process. The temperature of the process is generally between 50 and 80 degrees C.

A fourth method consists in the use of a centrifugal machine which it is known possesses peculiar effectiveness in destroying emulsions. At times this machine is employed alone, that is without subjecting the emulsion to any treatment before it is passed through the de-emulisfier. Then again at other times the emulsion is first treated with some suitable de-emulsifying agent and is then centrifuged. As a general rule the effectiveness of the machine is very great as the great centrifugal force is able to throw out of the oil various materials of greater specific gravity, namely the water and the mineral matters, which are primarily responsible for its emulsification.

The last general method is to employ electrolytes. It is common knowledge that emulsions cannot exist in the presence of electrolytes under certain conditions. This is a very simple method of destroying the emulsion and would probably be the best and most popular if it worked each and every time. But at times the desired results are not forthcoming. The coalesence that is effected by the addition of the electrolyte is due to the neutralization of the charge on the water globules. Dilute solutions of acids have been successfully used for this purpose, and so have solutions of ferric chloride, etc. But in the latter case it has been found that there is a certain tendency for jellies to be separated out in place of the water phase itself. This is of course objectionable.

Salting Out

The method most commonly employed belongs to this general class and is known as salting out. The addition of salt to a water solution or a water emulsion of an organic compound is known to reduce the solubility of that organic compound in the solvent with the result that the organic matter is precipitated from the solution or from the emulsion. Common salt can be used for this purpose or any other cheap and highly soluble inorganic salt, such as sodium sulphate. The salt dissolves in the water phase of the emulsion and reduces materially the solubility or pseudo-solubility of the oil in that phase with the result that the oil phase is separated out and the emulsion is destroyed. This is a very good way in which to handle the emulsions but it does not always work as well as may be desired.

While the laws and principles of colloid chemistry are of real value in the handling of the oil in the field, they are of even more importance and certainly afford a much wider field for study in connection with the refining of the petroleum. The treatment to which the crude oil is subjected right at the very start of the refining process introduces conditions which are of a colloidal character. Thus when the crude oil is treated with sulphuric acid and then with caustic soda in the preliminary purification soapy substances are formed which are known to possess emulsifying properties of a high degree. This is particularly true when the caustic soda solution is made with the aid of hard water. There is then apt to be present in the solution a gelatinous metallic hyroxide which tends to form a protective film and consequently gives rise to the formation of emulsions with the crude oil and even with the gasoline that is derived from the latter. The emulsions that are formed in this manner are very stable and for this reason it is much more advisable to use a well settled sodium hydroxide solution in the place of one that has been freshly prepared.

Used in Refining

Colloidal chemistry is of importance in the refining of petroleum because of the fact that all refining or purifying agents are now being used in the industry which owe their potency to their colloidal character. What is referred to is the use of inorganic gels, such as silica gel, and activated carbon. The action of these substances In removing the impurities from the crude oil is essentially one of colloidal character. The same is true of such substances as bauxite and the various colloidal clays and fuller's earths.

The writer has discussed the use of bauxite as a refining agent in a previous article. Suffice it to say that bauxite is a substance which possesses no adsorptive qualities in the natural state but when it is roasted and the greater part of the water which is held in combination has been removed, then it acquires adsorptive powers and becomes a very effective purifying agent. The adsorption of the impurities in the oil as well as the coloring matters that give it its undesirable color is a colloidal process and one that depends on the correct colloidal condition of the adsorptive agent if good results are to be obtained.

It might be well to say a few words about the mechanism of the refining action of the bauxite. This is one of surface adsorption. The surface of the bauxite contains a large number of ultramicroscopic pores and the surface area is enormous. When adsorption takes place there is a considerable evolution of heat. It is claimed that the surface energy which is possessed by this substance has the effect of decomposing and polymerizing the unsaturated hydrocarbons which are contained in the petroleum.

Silica gel and the colloidal hydroxides of such metals as iron, copper and aluminum are also refining agents which exert a colloidal chemical action on the impurities in the crude oil during the refining process. Many investigators have busied themselves with studying the structures of these colloidal substances so as to arrive at some definite explanation of their action on the petroleum impurities and to develop a law for their action so as to obtain greater efficiency with these substances in actual practice. In general it has been determined that silica gel behaves towards the petroleum impurities in much the same manner as bauxite.

Fuller's earth and special colloidal clays have been used for quite some time in the petroleum industry for refining purposes. These substances as well as all the other colloidal purifying media do not give any indication of their potency on chemical analysis and the only way in which to determine just how effective they are is to make an actual test with them.

An interesting colloidal refining agent which has been employed in recent years is activated charcoal. Activated charcoal is also used in the recovery of gasoline from natural gas and in the de-colorizing of refined petroleum products. The substance possesses strong adsorptive properties and it is known to be able to adsorb large volumes of gases.

There is no doubt but that the application of colloidal media and agents to the petroleum industry has resulted in a great improvement of technical methods for obtaining petroleum products of a high degree of purity. Practically every petroleum product has been benefitted in some way by being treated with these colloids.

Treating Used Oil With Fuller's Earth

(Continued from page 24)

ever interesting to determine just how much of the oil is lost in the cleansing process. It was found in treating two oils, one possessing a high acid number and the other a low acid number, that the yield of oil was the same in both, being 96 per cent. While this figure may not be reached in practical operations, nevertheless it is easy to see that the yield will be high.

Another test that was made was to determine the electrical properties of the refined oil and it was found that the product possessed as high resistance after being refined as it did when first employed.

In practical operation the refining of the oil may be carried out in two different ways. In the first method the oil may be charged into an agitator and then stirred with the addition of the requisite amount of Fuller's earth. In the second method the oil may be filtered through a layer of the earth. In the first method it is necessary to provide an apparatus which is steam jacketed. The oil is fed into the apparatus and then heated for a period of thirty to sixty minutes with the admixture of Fuller's earth.

While it is possible to carry out the refining process by means of a filter press, nevertheless in the oil industry this system has never been very popular nor has it given as good results as the agitation system. It is claimed that the latter method is much to be preferred to the former for this purpose.

A heat exchanger and condenser in one

Note the multiple shells of the G-R Sectional Condenser

With two sections, water can be used as the cooling medium in one unit and oil in another, thus providing a condenser and heat exchanger in one set.

Furthermore, a different "cut" or "fractionation" can be made in each section by offsetting the lower vapor connection to the side of the shell and draining the distillate from the sump thus formed in the vapor space.

And note, too, the many operating advantages of this arrangement. Sections can be added or removed to meet varying capacity requirements. The complete unit is readily transported and assembled if necessary to meet changing plant conditions. Inspection and cleaning is greatly facilitated.

Send the Coupon for Complete Information

THE GRISCOM-RUSSELL COMPANY
285 Madison Ave., New York

Philadelphia	Chicago	St. Louis	San Francisco
Boston	Cleveland	Kansas City	Los Angeles
Rochester	Detroit	Charlotte	Seattle
Pittsburgh	Milwaukee	New Orleans	Denver
Columbus	Indianapolis	Houston	Salt Lake City
	Minneapolis	Dallas	Tulsa

For Canada: Riley Engineering and Supply Company, Ltd., Toronto

Griscom-Russell
Heat Transfer Apparatus

Note these other G-R Units for lower repairing costs

Mineral Seal Oil Heat Exchangers

A compact, twin exchanger with strict counter-current flow to promote maximum rate of heat interchange.

G-R Vaneflo Gas Cooler

for cooling casing head or natural gas. Can be used as inter-, after-, or pre-cooler in absorption and compression type natural gasoline plants. Has low pressure loss and exceptional efficiency.

G-R Jacket Water Cooler

uses any source of raw water to cool the jacket water from oil and gas engines and compressor. The famous Multiwhirl Cooler—over 2000 in operation in every liquid cooling service.

G-R Gasoline Condenser

for condensing natural gasoline vapors in casinghead gasoline plants. Can also be used as a knockout box or fractionating tower control section with particularly close control of the end points.

G-R Twin Heat Exchanger

for the efficient interchange of heat between crude oil feed stock and still bottoms, cold water and hot oil, feed stock and hot still vapors, etc.

The Griscom-Russell Company,
285 Madison Ave., New York
Please send information on

- ☐ Sectional Condenser
- ☐ Mineral Seal Oil Heat Exchanger
- ☐ Vaneflo Gas Cooler
- ☐ Jacket Water Cooler
- ☐ Gasoline Condenser
- ☐ Twin Heat Exchanger

Name . . . . . .

Address . . . . . .

R 1-26

Tell them where you saw the ad.

Probably the most important economic change in the petroleum industry since its establishment in America in 1859, is now taking place It is almost revolutionary

It affects both production and refining reaching through the marketer to the ultimate consumer

It is changing the basis of long established relative values of light and heavy crudes

Light crude oil is no longer a yard stick for measuring the available supply of gasoline Low grade crudes and fuel oils

will hereafter be the largest resources for this purpose

It is changing the forecasts of requirements of crude to meet increasing gasoline demands

The main factor causing this revolutionary change is cracking, and the main factor in cracking is the Dubbs Cracking Process

Universal Oil Products Company
Owners of the Dubbs Process
310 South Michigan Ave
Chicago, Illinois

Forecast

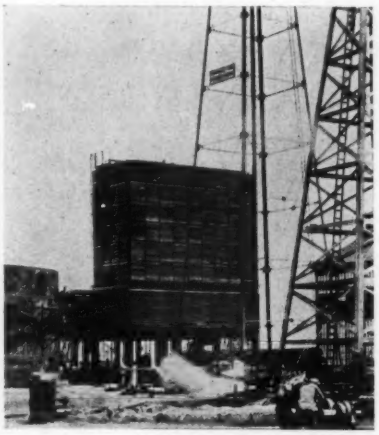
In the near future the refiner will not only run his gas oils and fuel oils through the cracking process but will run his crude, whether light or heavy, direct to the process, providing he has the Dubbs Process He will thereby through simultaneous topping and cracking produce all his gasoline in one operation direct from his crude In fact the start has already been made

Universal Oil Products Company
Owners of the Dubbs Process
310 South Michigan Ave
Chicago, Illinois

New Equipment, Catalogs, Bulletins, Books

Burhorn Cooling Towers Offer Four Advantages

Cooling towers built by the Edwin Burhorn Co., 25 West Broadway, New York, are constructed on four structural advantages—efficiency of the cooling apparatus, prevention of water waste during cooling, durable materials and possibility of removal.



A Burhorn Tower

This tower is an all-metal tower and consists of a structural steel frame made up of heavy sections of structural steel, the thickness of the main members being not less than ¼ inch at any point. The frame consists of heavy corner posts and in large towers, with intermediate angle-iron posts tied together with horizontal angles. The angles are provided with necsesary clips and gusset plates riveted on so that the various sections can be bolted together in the field and the frame is so designed that there are two bolts at each connection, so as to secure great rigidity. The horizontal angles carry a series of rolled steel beams, which are also arranged for bolting in place. A ladder of steel is provided on the outside for access to the top of the tower and means are also provided so that the inside of the tower is equally accessible. The top of the tower is provided with steel walkway to give access to the distributing system at the top of the tower.

All four sides of the cooling tower frame are protected by "Burhorn" system of patented louvres made of Matola metal. These louvres are designed to be bolted to angle iron clips with four bolts to each louvre and the louvres are so designed that a free access to prevailing winds is provided in the cooling tower, whereas any spray which would attempt to blow outside, is intercepted by the louvres and delivered back into the distributing troughs, as part of the louvres, which discharges such spray back into the tower system.

The cooling surface is made up of Matola metal troughs arranged in series and usually spaced so that the troughs in deck run at right angles to the troughs in adjacent decks. Each trough is fitted at each end with patented system of galvanized cast iron closing ends and interlocking devices and arranged so that the troughs can be securely bolted to the supporting beams. The castings are so designed that the supporting beams are not punched or drilled and therefore do not offer any chance for rusting to take place at bolt holes. The cooling surface so designed, works very efficiently and rectifies the tendency of the wind to blow the water to the leeward side. The water dropping from one deck to the one below is deflected slightly toward the leeward. The water in the troughs in the deck below naturally takes its level and redistributes from this level position. This feature of redistribution in connection with the louvre system enables the "Burhorn" tower to guarantee the loss of water not to exceed that due to evaporation.

The top deck is fitted with distributing system of the "Packers" type, or "Standard" type.

The "Packers" type consists of main distributing pipe with Matola metal vent stack. The "Standard" system, which is usually used in very large towers, consists of a steel main distributing trough with Matola metal branch troughs. The main trough is made in sections in very large towers, each section controlled by a valve so that the quantity of water can be regulated, or any section can be cut out for examinaion at will.

The "BURHORN" tower was originally put on the market about 25 years ago and has been improved from time to time so that the present apparatus is the result of 25 years of intensive study theoretically and in the field.

Liberty Surface Cleaner Has Variety of Uses

In response to the demand for a cleaner to remove rust, paint, scale, etc., from exterior surfaces, the Liberty Manufacturing Comany, Frick Building, Pittsburgh, Pennsylvania, announces the Liberty Surface Cleaners. The machine is adapted to any service requiring the rotary motion of a steel brush.

The pneumatic type consists of an air-operated motor with an aluminum valve handle which screws into the rear opening in the case of the motor, a steel wire brush mounted in an aluminum cup being attached to the shaft of the motor. An air pressure of 50 to 75 pounds is necessary to operate the cleaner. A sight feed lubricator for distributing oil to the motor and a hose connection for the operating hose are furnished as regular equipment.

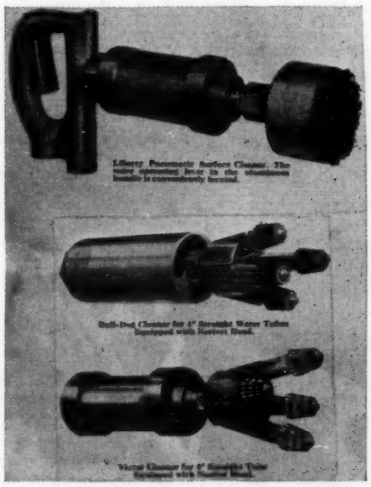
Construction of the brush is said to have special features. The steel wire in rugged tufts is mounted in the steel base, and the brush can be used with the tufts extended in a position parallel with the base in the form of a wheel or with the tufts turned at right angles to the base and held in place by the aluminum cup.

Two aluminum discs or washers are furnished, which may be placed between the brush and the cup base as the brush wears down making the brush serviceable to the full length of the steel wire bristles.

Where compressed air is not available an electrically driven cleaner can be supplied. The motor is of the universal type and is furnished for 110 or 220 volts. The handles are adjustable and the grip may be inserted in several positions, wherever most convenient.

Liberty cleaners are built in several types, and in sizes to fit all boiler tubes, straight or curved. They may be used with regular cutting heads and drills for removing scale formation on the inside of water tubes. With the Universal joint and drill, they effectively remove by vibration, the scale from the outside of the fire tubes.

Additional information may be had by writing the company.



Top—Liberty cleaner for surface work. Bottom—cleaners for use on boiler tubes

New Book of Laughs

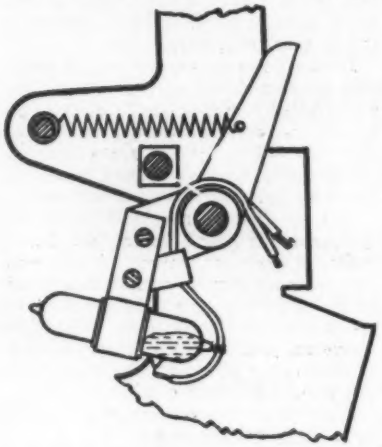
"The Unloading Rack" is a house organ full of humorous jokes, recently published by the A. Y. McDonald Manufacturing Company, Dubuque, Iowa. The book is a convenient pocket size and just big enough to give a dozen or more good laughs.

Anyone desiring to be put on the mailing list can receive a copy each month by writing the company and stating such a desire.

Contact Switch Eliminates Troubles in Recorders

To eliminate electrical contact troubles in connection with pyrometer recorders, the engineers of Charles Englehard, Inc., 30 Church Street, New York City, have developed a mercury contact switch which is said to be unfailing in its operation.

The accompanying sketch illustrates the operation of this switch. The working parts consist of a small glass tube containing mercury, a minute quantity of oil, and an inert gas. Platinum electrodes pass through the glass and are sealed. In position "A" the mercury



Position A

makes contact with both the electrodes, completing the circuit. To break the circuit, the tube is tilted slightly to position "B" causing the mercury to flow away from the terminals to the other end of the tube.

The maximum angle of tilt required to make the mercury flow back and forth is only 15 degrees when operated with extreme slowness. When tilted quickly as in actual practice in the pyrometer recorder, the angle is less.

The required number of mercury contacts are all mounted side by side within the recorder case, requiring but little space. For example, where six records are to be made on one chart simultaneously, as is possible with this type of recorder, six mercury contact switches are employed. In other words, a separate mercury switch is used for each circuit.

Further information will be supplied by Charles Englehard, Inc., 30 Church Street, New York Citv.

Blackmer Moves to Grand Rapids

Grand Rapids, Mich.—Blackmer Rotary Pump Company, formerly of Petosky, Michigan, has recently moved to 1809 Century Avenue, Grand Rapids.

The change of address is due to the fact that the company has recently erected a new factory in Grand Rapids, providing space for new general offices.

Elliott Company Bulletins

The Elliott Company, Jeannette, Pa., announce the publication of several four-page and eight-page bulletins of interest to the refining industry:

Bulletin C-4, the air leakage meter bulletin describes a device for measuring directly in cubic feet the air leakage into a surface condenser. The bulletin tells how this meter is used for checking up old condensers, detecting inferior condensation.

Bulletin K-1 gives details on the Faber self-cleaning blow-off valve.

The non-return valve is decribed in bulletin S-7. This valve is of three types: the Elliott, Lagonda non-return valve for ordinary and high pressure, and high temperature service.

Liberty surface cleaners, designed for all sorts of flat surfaces, the removing of rust, paint, etc., are described in bulletin Z-3.

All these publications can be had by writing the Elliott Company, Jeannette, Pennsylvania.

Jenkin Unit to be Installed

East Chicago, Indiana.—The Independent Oil and Gas Company, Tulsa, Oklahoma, has contracted with Graver Corporation, East Chicago, Indiana, for one 1000-barrel standard unit Jenkins Cracking Process for installation at its Okmulgee, Oklahoma, refinery.

The Bolene Refining Company has also ordered two 1000-barrel units for installation at its Enid, Oklahoma, refinery.

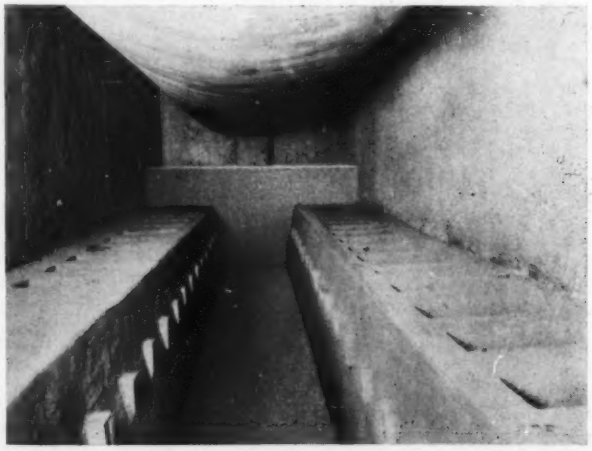
Plastic Refractory Has Special Advantages

The Plibrico Jointless Firebrick Company, Chicago, Illinois, recommends its monolithic refractory Plibrico for use wherever firebrick is necessary about refineries.

Plibrico is a plastic material. While in this plastic state it is pounded into place where it is to be used. The first heat of the furnace vitrifies it to a rock-like hardness and gives it ability to withstand temperatures to 3100 degrees, according to the manufacturers.

Special advantages of this refractory are said to be: it eliminates all joints in the furnace; installation is a simple matter, making it unnecessary for a mason or bricklayer to be employed; it has unusually long life.

Additional information will be supplied by the company on request.



Taylor Instrument Catalog

Taylor Instrument Companies, Rochester, New York, are distributing copies of a new catalog showing recent developments and new models in Taylor Instruments. Instruments described include Tycos Pyrometers, all types; Tycos high-resistance portable Test Outfits; Tycos Thermopyres; Automatic Pyrometer Controllers; Radiation Pyrometers; Selective Switching Devices; Protection Cases; Thermocouples; and general information on pyrometer maintenance is provided.

Copies of the catalog will be mailed on request.

Paper on Boiler Water

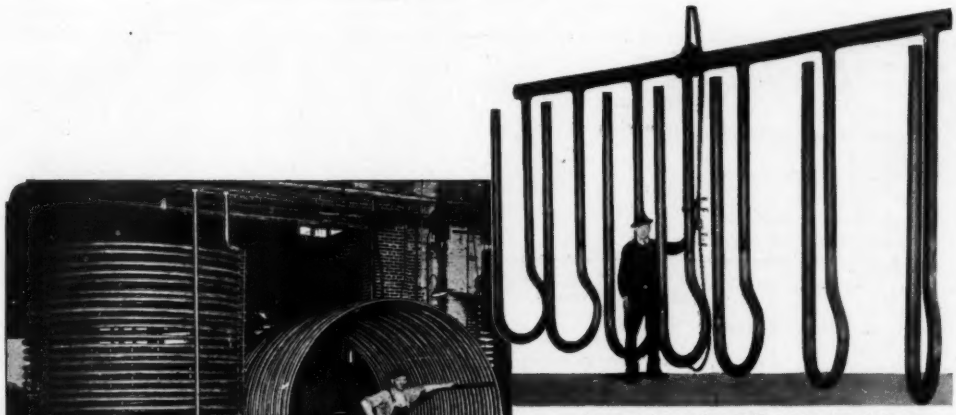
"Concentration in Boilers," by Grant D. Bradshaw, is a technical paper which refinery engineers might read with profit. The paper was read before the Engineering Society of Western Pennsylvania and has been reprinted from the proceedings of this society. It is being distributed to those requesting it, by the Andrews-Bradshaw Company, 530 Fourth Avenue, Pittsburgh, Pa.

The paper goes into the chemistry of the boiler-water troubles and gives a complete analysis in several instances, of what happened. A number of sketches are included to illustrate different points.

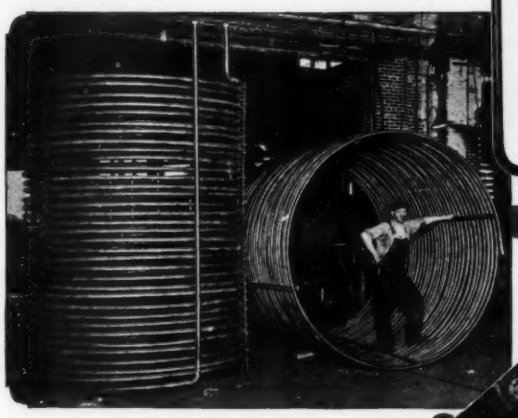
Schutte and Koerting Bulletins

Schutte and Koerting Company, Philadelphia, Pa., announce a new edition of the bulletin on their small bronze and forged steel valves. These valves are for medium and high pressure service in steam, air water and oil lines, and are divided into three main groups: bronze valves of various types for 250 pounds working pressure; bronze hydraulic valves for 1500 pounds and 4000 pounds pressure, and forged steel stop valves for pressures from 400 to 1200 pounds.

Copies of the bulletin will be mailed to any one on request.



Manifold from 4" and 6" standard weight pipe



Continuous welded spiral coils 10' 0" dia.-2" pipe

90 Bend on 10' 0" radius from 24" O. D. pipe with ½" wall

MIDWEST Piping Service to the Oil Industry

ARE you ever puzzled by some piping problem which confronts you? Do you ever wonder how you will get the required amount of condensing or heat exchanging surface in the space available? Or are you ever undecided how to take care of expansion and contraction? These are only a few piping questions that arise—you probably can add many more.

If you are confronted with such problems, the Midwest Piping & Supply Co. can be of very definite service to you. This organization devotes its entire ability, energy, and time to pipe fabrication and the solution of piping problems. Our engineers are trained "pipe men" and their long and varied experience is at your command.

Your problem will indeed be unusual, if we have not previously had several very similar to it.

And if you know exactly what piping you require, we will follow your instructions accurately and intelligently.

Midwest Piping for the Oil Industry includes bends, continuous welded coils, headers, and fabricated pipe of all descriptions for operating conditions varying from vacuum to highest pressures and temperatures. The pipe joints are Midwest, Van Stone, or screwed flange type according to requirements of the particular service.

Midwest facilities are unexcelled for accurate and immediate production. Large and complete stocks of valves and fittings are maintained for prompt assembly with fabricated piping. Our location is also to your advantage.

When you need fabricated piping—write, wire or phone Midwest.

MIDWEST PIPING & SUPPLY CO.

Second and Miller Streets
St. Louis, Mo.
Tulsa Office: 805 Mayo Building. Chicago Office: 208 South La Salle St.

Fabricators of Oil Refinery, Natural Gasoline Plant and Power Piping

Tell them where you saw the ad.

Gasoline Manufacturers to Have Part on A. P. I. Program

(Continued from page 16)

Committee report, M. W. Mattison, chairman.

"The General Balance Sheet," general discussoin.

Group 4—General topic: Natural Gasoline.

(Note: This is a joint session between members of the Institute and the Association of Natural Gasoline Manufacturers. The program has been arranged by the latter named organization.)

Presiding: Harry J. Bauer, Pacific Gasoline Company.

"Natural Gasoline—Its Present Position and Future Outlook," E. L. Peck, president, Association of Natural Gasoline Manufacturers. Discussion led by A. M. Ballard, Sun Oil Company.

"What Is Good Natural Gasoline From the Standpoint of the Refiner?" (Speaker to be announced.) Discussion led by R. E. Bering, California Gasoline Corporation. 2:00 p.m.—Group meetings:

Group 1—General topic: Standardization of Oil Field Equipment.

"Standardization of Rig Irons." Committee report, H. J. Lockhart, national chairman.

"Standardization of Rotary Drilling Equipment." Committee report, Capt. J. F. Lucey, national chairman.

"Standardization of Wire Rope and Manila Cordage." Committee report, C. C. Sharpenberg, national chairman.

"Standardization of Pumping Equipment and Engines." Committee report, A. V. Hoenig, national chairman.

"Standardization of Steel Storage and Production Tanks." Committee report, G. M. Vandaveer, national chairman.

Group 2—General topic: Fire Prevention and Protection in the Petroleum Industry.

"Protection Against Static in Petroleum Marketing," J. A. Watterson, Standard Oil Company (Ohio).

"Steam Protection for Oil Tanks," G. O. Wilson, Standard Oil Company (California).

"Fire Prevention and Protection in the Petroleum Industry," G. H. Haupt, Standard Oil Company (New Jersey).

Group 3—General topic: Uniform Methods of Oil Accounting.

"The General Balance Sheet." Discussion continued.

Group 4—General topic: Natural Gasoline.

(Note: This is a joint sessoin between members of the Institute and the Association of Natural Gasoline Manufacturers. The program has been arranged by the latter named organization.)

Presiding: Harry J. Bauer, Pacific Gasoline Company.

"Methods of Manufacture, Past and Present," F. E. Rice, Phillips Petroleum Company. Discussion led by S. B. Mosier, Signal Gasoline Company of California.

Subject to be announced: D. F. Buchanan, Chestnut & Smith Corporation. Discussion led by F. S. Wade, Lomita Gasoline Company of California.

Thursday, January 21.

(Note: The morning and afternoon on this day will be devoted to group sessions, arranged by general topics, at which the various subjects will first be treated in addresses by selected speakers. After each speaker has finished opportunity will be given for general discussion of the subject. The annual dinner will be at 8 o'clock in the evening.

10:30 a.m.—Meeting of Board of Directors. (Luncheon for members of the board at noon.)

10:00 a.m.—Group meetings: Group 1—General topic: Improvement of Oil Drilling and Production Methods and Equipment.

"The Trend of Electrification in the Petroleum Industry," H. E. Dralle, Westinghouse Electric & Manufacuring Company.

"The Hild Electric Drive," Thomas Fleming, Jr., Oil Well Supply Company.

"Use of Electric Power from the Oil Operator's Point of View," L. B. Riddle, Shaffer Oil & Refining Company.

"Oil and Gas Engines," Pat Shouvlin, Superior Gas Engine Company.

Group 2—General topic: Oil as Fuel.

"Domestic Oil Burning," J. C. Johnson, S. T. Johnson Company.

"Status of the Oil Burner in the Heating Industry," Homer Linn, American Radiator Company.

"Oil Burning on the Pacific Coast," J. B. Arthur, Union Oil Company.

"Oil as Fuel for Electric Transportation," J. C. Thirlwall, General Electric Company.

Group 3—General topic: Uniform Methods of Oil Accounting.

Presentation of prepared papers on chart of accounts for production department, casinghead gas department, refinery department, sales (marketing) department. General discussion.

Group 4—General topic: Oil Transportation by Railroad.

"Seeking Safety in Railroad Transportation," Colonel B. W. Dunn, Bureau of Explosives. A Bureau of Explosives educational moving picture film will be shown.

"The Oil Freight Rate Situation," Fayette B. Dow.

2:00 p.m.—Group 1—General topic: California Production Engineering Symposium.

(Note: This is a joint session between the Standardization division of the Institute and the petroleum division and the California sections of the American Institute of Mining and Metallurgical engineers. The program has been arranged by representatives of the latter named organization.)

"Deep Drilling Practices," R. H. Garrison, E. J. Miley Company.

"Improvements in Production Methods," (speaker to be announced.) Discussion.

"Economic Effect." (Leader to be announced.)

"Gas Lift," led by R. P. McLaughlin.

"Influence of Submergence on the Efficiency of the Oil Well Plunger Pump." L. C. Uren, University of California, assisted by S. B. Sargent and V. J. Collins.

Group 2—General topics: Special Products from Petroleum.

"Experimental Studies in the Use of Petroleum Oils as Insecticides for Citrus and Deciduous Trees," E. R. deOng, University of California.

"Special Uses of Petroleum Products," J. B. Terry, Standard Oil Company (California).

"Organic Chemicals from Still-Gases." (Speaker to be announced.)

Group 3—General topic: Methods of Credits and Collections.

"Extending Credit," F. H. Bowman, Pure Oil Company.

"Methods of Collection," (Speaker to be announced.)

"Functions of Credit Interchange Bureaus." (Speaker to be announced.)

Group 4—General topic: The Relations Between the Oil Industry and the Public.

"An Outsider Looks In at the Petroleum Industry," Judson C. Welliver, Public Relations Committee.

"Getting the Public to See the Industry as It Really Is." (Speaker to be announced.)

"Co-Operative Work to Establish an Understanding with the Public." (Speaker to be announced.)

8:00 p.m—Annual dinner. There will be no speeches at the annual dinner. The program is being arranged by a special committee of Californians. Reservations for the annual dinner should be made promptly. The price is $6.00 per plate. The program committee regrets very much that on account of the limitations of seating capacity attendance must of necessity be restricted to men only.

Entertainment

A California executive committee on reception and entertainment is arranging a program of entertainment in connection with the sixth annual meeting. Under its auspices:

An informal reception and smoker will be given at 8 o'clock Monday evening, January 18, in the ball room foyer of the Biltmore Hotel.

The Chamber of Mines and Oil will appoint a general reception committee.

A ladies reception committee has been appointed.

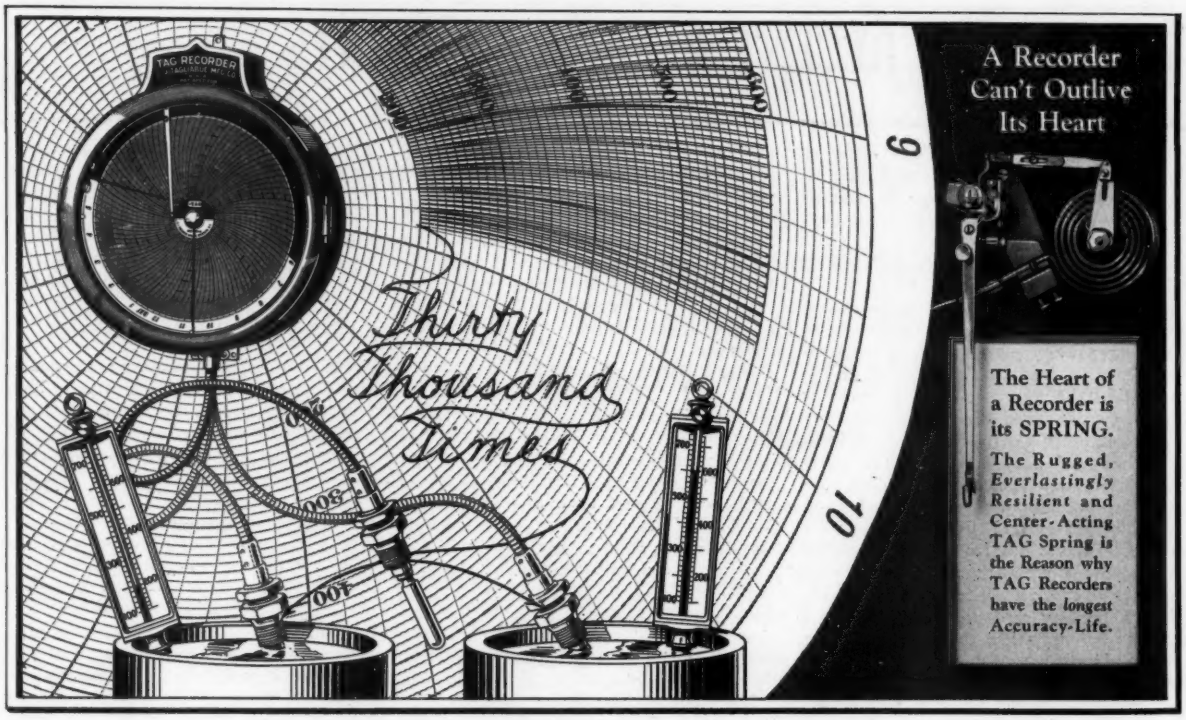
On Friday, January 22, beginning at 9:30 o'clock a.m. and ending at 4 p.m., visiting members will be given an automobile trip to the Southern California oil fields. The route will be as follows:

Section A—Inglewood, El Segundo, Torrance, Watson, Long Beach (stop for luncheon), Signal Hill, Santa Fe Springs, thence via Northam to Coyote Hills property of Standard Oil Company, Montebello and return.

Section B—Montebello, thence via Whittier to Coyote Hills property of Standard Oil Company, thence via Northam to Santa Fe Springs, Signal Hill, Long Beach (stop for luncheon), Watson, Torrance, El Segundo, Inglewood and return.

A golf tournament will be held, under the direction of a special committee, on Friday, January 22. Transportation to the Golf Club and luncheon for the participants will be provided.

The committee is making arrangements for a dance in the ball room of the Biltmore Hotel, 9 to 12 o'clock p. m., Friday, January 22.


TAG RECORDER
Thirty Thousand Times
A Recorder Can't Outlive Its Heart
The Heart of a Recorder is its SPRING.
The Rugged, Everlastingly Resilient and Center-Acting TAG Spring is the Reason why TAG Recorders have the longest Accuracy-Life.

NOW IT CAN BE TOLD

The Report of the Severest Test Ever Made on Recording Thermometers

WHY IT WAS HUSHED FOR FOUR YEARS

With the ambitious aim of producing the ideal recording thermometer, TAG fifteen years ago went to work.

Eleven years of development . . . four years ago the goal in sight: test models showing an enduring accuracy never before approached . . . But how accurate would the *manufactured* instruments be? How long would they *stay* accurate under the strains of industrial service? Would any parts weaken or wear? There was only one way to find out: When the first production lot came through, one instrument was picked at random and put to a searching test:

The sensitive bulb of this stock recorder was plunged alternately into two solutions, with a 400° difference of temperature. These sudden shifts were made by a machine, every sixty seconds. Such extremes seldom occur in use, and never at such a rate. Each test *hour* equalled *weeks* of industrial service.

Fifty hours of this rough treatment, and no breakdown—here indeed was a winning performance! But how serious was the loss of accuracy, if any?

There was no loss at all—the recorder was found to give exact readings at all temperatures, high, low and medium. That *was* a world record! No question about it . . . But why stop the test? Why not discover *how much longer* than all others would TAG Recording Thermometers stay accurate under excessive strains? So the test was resumed. . . .

After *500 hours* of this terrific ordeal—after 30,000 strainings of its vital parts—the recorder was still accurate to a hairline!

Meanwhile, selling had begun. The new instrument's *weak* points *had to be known*. So the recorder was taken apart and minutely examined for wear, weakening, and other *expected* effects.

No trace of any! *That recorder was like a new one!*

It was then assumed that this one recorder, or first lot, might be exceptional. . . . Others were put through similar tests that would ruin cheaper recorders, and then checked and inspected.

Always the same results—no wear, no loss of accuracy.

These were facts, but they were almost unbelievable. They could not *be told*, lest a century's reputation for accuracy—in assertions as in instruments—be exposed to doubt.

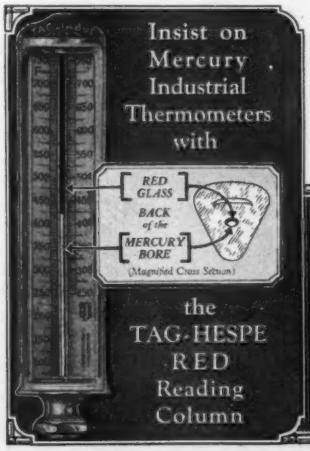
Therefore it was decided to wait a few years, when TAG Recording Thermometers, through performance in all industries, would prove their superiority.

They *have* proved it . . . by *better* performance.

In *all* industries . . .

And now it can be told.

. . . Let us tell it to you more fully: send for Bulletin B-905


Insist on Mercury Industrial Thermometers with
RED GLASS
BACK of the MERCURY BORE
(Magnified Cross Section)
the TAG-HESPE RED Reading Column

C. J. TAGLIABUE MFG. CO.

18 to 88 Thirty Third St., Brooklyn, N.Y.

BOSTON PITTSBURG ST LOUIS CHICAGO
TORONTO TULSA SAN FRANCISCO HOUSTON

TAGLIABUE MFG. CO. N.Y.

RECENT REFINERY PATENTS

BY STAFF REPRESENTATIVE

Washington, D. C.—The following patents of interest to the refining industry were issued during the month of December by the United States Patent Office:

No. 1,563,818, granted December 1 to Lynton D. Wyant, Tulsa, Okla., for a process of cracking oil and removing carbon therefrom, which consists in heating a body of oil to cracking temperature, agitating the heated oil to maintain the liberated carbon more or less in suspension, ejecting portions of oil containing charges of carbon from the body of heated oil through pressure directed generally through the gases present in and as evolved from the body of oil and then separating the charges of carbon from the oil within the still and discharging the carbon so collected; and an oil cracking still having a heating and agitating chamber, means for agitating the body of oil in said chamber, a collector arranged above the level of the oil, conductors depending into the body of oil for the collection of evolved gases and upflow therethrough into said collector of portions of the oil and portions of carbon carried thereby by the pressure of said gases, and means for separating the carbon from the oil ejected into the collector and discharging the separated carbon from the still.

No. 1,564,179, granted December 1 to Herbert L. Ridenour, Hicksville, Ohio, for a control for pipes of tanks comprising a supporting frame adapted for attachment to a discharge pipe of an oil tank associated with a valve for such pipe, mechanism for moving the valve to an open and a closed position, a suitably operated valve arresting means, a float in the tank the gravity of which communicates motion to the valve arresting means, and an auxiliary device operated by the buoyancy of the float for communicating motion to the valve operating arresting means.

No. 1,564,187, granted December 8 to Otto G. Ahrens, Karnes, Texas, for a device for removing dirt from tanks comprising a pipe extending down into the tank; a worm in the pipe; a second worm universally connected to the pipe worm and disposed at the bottom of the tank; a bearing from the free end of the said second worm; wires attached to said bearing and extended outside the tank; and means for rotating the said pipe worm.

No. 1,564,271, granted December 8 to John T. Pope, Salt Lake City, Utah, for an oil shale retort consisting of a sheet metal casing having a furnace thereunder; an angle iron frame secured to the sides of said casing; a grid composed of inverted T-irons and fire brick slabs placed between the furnace and said sheet metal casing; an inclined metal table suspended from said frame; means to reciprocate said table longitudinally; a perforated steam rack spaced above said table; means to conduct superheated steam to said steam rack; chutes to connect crushed shale to and from said table; rotatable roller gates to control the passage of crushed shale through said retort; and a pipe line to conduct gas from said casing.

No. 1,564,501, granted December 8 to James W. Weir, Fillmore, Calif., assignor of one-half to John C. Black, Destrehan, La., for a method of refining lubricating oil stocks, which comprises treating the oil with sulphuric acid, settling and removing the major portion of the sludge, then adding a comminuted solid absorbent material, heating the mixture to a temperature sufficient to decompose the remaining sludge and liberate sulphur dioxide therefrom, and separating the adsorbent material with the matters adsorbed thereon from the oil stock.

No. 1,564,984, granted December 8 to William H. Stilson, New York, assignor to Stilson Process Corp., Dover, Del., for a means for collecting condensates in petroleum refining apparatus, comprising in combination, a vapor line, a dephlegmating by-pass associated therewith comprising a pair of T's disposed in said vapor line in spaced relation, a branch connection below the vapor line connecting said T's, a pipe depending from said branch connection, a carbon trap in said pipe having a plurality of valves adapted to be manipulated to permit the withdrawal of the carbon, and a connection above the carbon trap for withdrawing the condensate collected.

No. 1,565,135, granted December 8 to Clarence J. Wolfe, Quay, Okla., for a separator for gas and oil comprising a tank, means for yieldably supporting the tank and comprising a stationary structure, cross bars connected to the tank, and yieldable supports between the cross bars and stationary structure, said yieldable supports comprising telescoping cylinders and coil springs within the cylinders and engaging the stationary structure and the cross bars; flexible supply line conveying commingled gas and oil to the tank, a pressure controlled gas outlet leading from the upper part of the tank, an outlet for the oil leading from the lower part of the tank, a valve controlling said outlet, and motion transmission means between the tank and the valve for opening the valve as the tank moves downwardly and closing the valve as the tank moves upwardly.

No. 1,565,326, granted December 15 to Fred C. Niece, Cleveland, assignor to the International Holding Co., Cleveland, for a process for cracking hydrocarbons which comprises subjecting to a condensing temperature hydrocarbon vapors and gases passing from a hydro carbon-cracking chamber, feeding other hydrocarbons into a molten body through an inner chamber in said body, and while hydrocarbon is discharged from said inner chamber into said molten body effecting the subjection, to the heat of and within said molten body, of hydrocarbon gases and vapors remaining uncondensed during the subjection of the first-mentioned vapors and gases to the aforesaid condensing temperature.

No. 1,565,327, granted December 15 to Fred G. Niece, Cleveland, assignor to The International Holding Co., Cleveland, for an apparatus for cracking hydrocarbons comprising a hydrocarbon-cracking receptacle which has a vapor-outlet and contains a molten body penetrable by hydrocarbons and not vaporizable at the required hydrocarbon-cracking temperature, a condenser, means for feeding hydrocarbon gases and vapors to the condenser from the aforesaid vapor outlet, an inner chamber formed within and discharging into said molten body, means for feeding hydrocarbon into the molten body through said inner chamber, and means for feeding, into said molten body and externally of said inner chamber, gases and vapors which have passed uncondensed through the condenser.

No. 1,565,409, granted December 15 to Leonce Blanchet, Paris, France, assignor to La Societe de Chimie et a Catalyse Industrielle Siege Social, Paris, for a unitary gas retort embodying a lower catalyzing compartment, and a separate upper vaporizing compartment mounted directly upon and directly communicating with the catalyzing compartment; means for supplying liquid hydrocarbon to the vaporizing compartment; and catalyzers disposed in a plurality of removable rows upon the floor of the catalyzing compartment and over which the vapors from the vaporizing compartment are caused to pass.

No. 1,565,749, granted December 15 to Homer A. Mossor, Stoffel, W. Va., assignor to South Penn Oil Co., Pittsburgh, for a process of recovering gasoline from natural gas, comprising removing gasoline constituents from the gas and subjecting it under an elevated pressure to an absorbing menstruum to remove the gasoline constituents from the gas, maintaining the increase in gravity of the menstruum due to its absorption of constituents from the gas at not more than one degree Baume, and subsequently separating from the menstruum by reduction of pressure on it and without elevating its temperature the constituents previously absorbed by it; and a process of removing

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gasoline from wet natural gas, comprising first compressing and cooling the gas to remove as a liquid a portion of the gasoline from it, then removing uncondensed gasoline from the compressed gas by subjecting the gas to an absorbing menstruum, separating the menstruum from the denuded gas, subsequently reducing the pressure upon the charged menstruum to remove from it as vapor its gasoilne content, and mixing the vapor thus removed from the menstruum with wet natural gas before it is subjected to the compression and cooling step.

No. 1,565,922, granted December 15 to Harold C. Eddy, Los Angeles, assignor to Petroleum Rectifying Co. of California, for a process of dehydrating emulsions containing material in suspension which comprises subjecting the emulsion to the action of an electric field for the purpose of agglomerating and precipitating the water and solids in suspension; removing the material so precipitated; and filtering the residue to agglomerate the water remaining in the residue.

No. 1,565,997, granted December 15 to Charles W. Girvin, Buena Park, Calif., assignor to Petroleum Rectifying Co. of California, for a centrifugal dehydrator consisting of means for subjecting emulsions of oil and water to an electric field to coalesce particles of water; and centrifuging means for separating the oil from the water.

No. 1,566,000, granted December 15 to Richard W. Hanna, Piedmont, and Orville Ellsworth Cushman and Theodore William Doell, Berkeley, Calif., assignors to Standard Oil Co., San Francisco, for a process of manufacturing a lubricating oil of green fluorescence from a petroleum oil normally yielding an oil of different fluorescence, which includes combining with such oil, oil from the residuum of a cracking process wherein a petroleum oil has been subjected to the requisite temperature and pressure to decompose part of the oil into relatively lower boiling point oil and to stabilize the residuum; and a lubricating oil possessing a green fluorescence comprising a combination of lubricating oil from the residue of a cracking process wherein the requisite temperature and pressure have been maintained to produce a polymerized and stabilized viscous oil stock, and lubricating oil obtained from petroleum by operations carried out below such stabilizing conditions of temperature and pressure.

No. 1,566,008, granted December 15 to Carl G. Hinrichs, St. Louis, for a process of treating natural petroleum emulsions which consists in thoroughly mixing therewith a chlorine addition product of a liquid fatty acid in sufficient quantity to effect a separation of the oil from the brine and foreign matter of the emulsion.

No. 1,566,009, granted December 15 to Carl G. Hinrichs, St. Louis, for a method of treating an aqueous emulsion in hydrocarbon oil which includes the mixing of a water soluble sulphocyanide therewith.

No. 1,566,110, granted December 15 to Ellis Mallery, Los Angeles, for a method of constructing oil storage, comprising a reservoir, a buoyant cover formed in a dock outside said reservoir, and floating said cover into place in said reservoir.

No. 1,566,341, granted December 25 to Fred G. Niece, Cleveland, assignor to The International Holding Co., Cleveland, for a hydrocarbon-treating apparatus comprising a hydrocarbon-cracking receptacle which has a vapor-outlet, a molten body contained in said receptacle and penetrable by hydrocarbons and not vaporizable at the desired hydrocarbon-cracking temperature, an endwise movable upright cylinder arranged at the upper portion of said hydrocarbon-cracking receptacle, means for supplying fluid under presure into said cylinder from a point externally of the molten-body-containing receptacle, a feed pipe connected to and movable with said cylinder, and means independent of said pipe and connected cylinder into and communicating with the molten body.

No. 1,566,416, granted December 22 to Fred G. Niece, Cleveland, assignor to The International Holding Co., Cleveland, for an apparatus for treating hydrocarbons comprising a closed receptacle which has a vapor-outlet and contains a molten body penetrable by hydrocarbons and not vaporizable at

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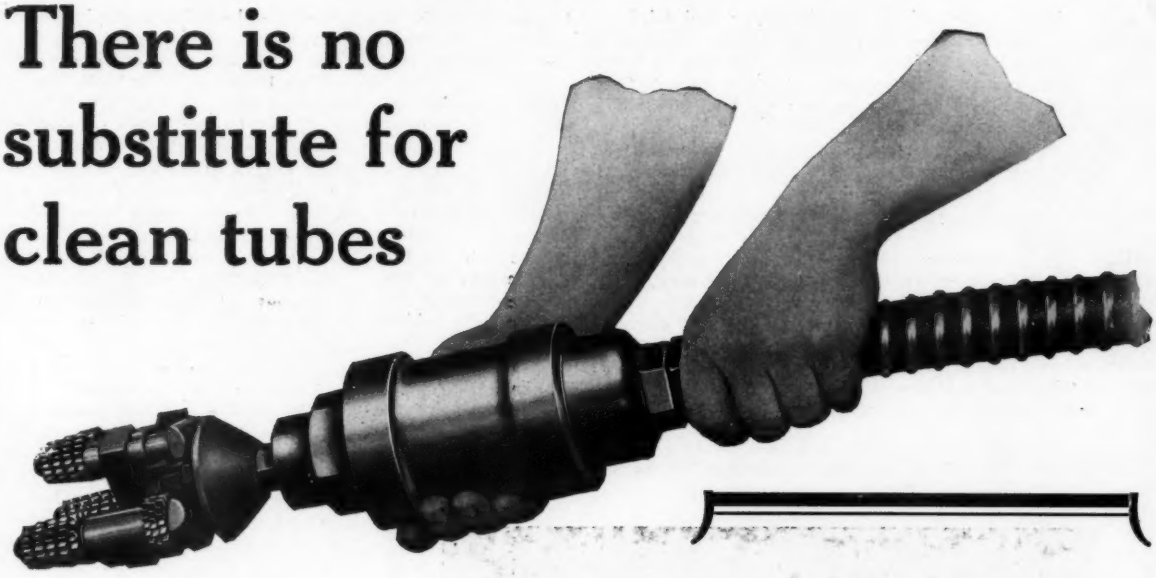

When tubes in cracking still furnaces, condensers, heat exchangers, as well as vapor, residuum and transfer lines become encrusted with scale, there is just one thing to do and that is—clean them.

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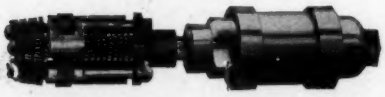

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the required hydrocarbon-cracking temperature, an endwise movable upright feed-pipe discharging into said molten body, and an upright feed-pipe arranged internally of and spaced from the first-mentioned pipe and movable upwardly during upward movement of said first-mentioned pipe.

No. 1,566,825, granted December 22 to Gentry Cash, Whiting, Ind., assignor to Standard Oil Co., Chicago, for a method of preventing evaporation losses from storage tanks which consists in freely connecting the vapor vent of such a tank with a chamber open to the atmosphere whereby vapors from the tank are discharged into said chamber and are retracted therefrom into the tank on contraction of the contents of the latter, and means for maintaining the gaseous contents of the chamber in quiescence between the inlet to the chamber from the tank and its outlet.

No. 1,566,828, granted December 22 to Edgar M. Clark, New York, assignor to Standard Development Co., a corporation of Delaware, for a process of utilizing the contained heat of a fire-heated still and setting at the end of a pressure-distillation of a heavy oil for the production of gasoline for the treatment of the residues of the distillation, said residues being of about 20 degrees Baume density, which consists in withdrawing the still fire, subsequently passing steam through the residues and condensing the evolved vapors until about 60 per cent of the oil of the residues have been removed and condensed, and withdrawing the residual oil from the still.

No. 1,566,921, granted December 22 to John Primrose, New York, assignor to Power Specialty Co., New York, for an oil still having banks or groups of tubes exposed to the hot gases in different parts of their course, and means for taking off, returning to and causing to reflow through the bank or group of hottest tubes only, oil that has already passed through the still.

No. 1,566,943, granted December 22 to Robert E. Wilson, Chicago, and Eugene P. Brown, Whiting, Ind., assignors to Standard Oil Co., Whiting, Ind., for a method of preparing a fabric impervious to the vapors of petroleum oil products which consists in applying to a textile fabric a continuous coating of a mixture of glue and glycerine and dusting a finely divided inert solid thereupon; and a fabric impervious to petroleum vapors consisting of a textile fabric, a continuous coating of glue and glycerine upon said fabric and a coating of adherent finely divided solid matter thereupon.

No. 1,566,944, granted December 22 to Robert E. Wilson, Chicago, assignor to Standard Oil Company, Whiting, Ind., for a method of preventing loss by evaporation from a vented storage tank which comprises providing a sole outlet from the vapor space of such a tank to and through a body of silica gel, and attemperating the silica gel to a temperature at least as high during suction into the tank as that prevailing during expiration from the tank.

No. 1,567,062, granted December 29 to Frederick B. Koontz, Tulsa, Okla., assignor to Cosden & Co., Tulsa, for a process of and apparatus for cracking hydrocarbons comprising conducting a stream of hydrocarbons through a cracking zone, where a cracking temperature is maintained, discharging the resultant highly heated stream into a separating chamber and depositing the carbonaceous residue in said chamber, maintaining the contents of said separating chamber at a temperature high enough to cause free evaporation of relatively low boiling liquid in the carbonaceous residue, removing the carbonaceous residue as it accumulates in said separating chamber and discharging it from the system, discharging the vapors from said separating chamber in an upwrad direction and at a velocity low enough to permit free precipitation of carbonaceous material in the rising vapors, at the same time dropping carbonaceaus material from the rising stream of vapors to said separating chamber, then subjecting the relatively clean vapors to a reflext condensing action to obtain clean reflux condensate freed from said carbonaceous material, at the same time heating fresh charging stock and removing low boiling point vapors therefrom, controlling the reflux condensing action to condense more than 70 per cent of the vapors, separately condensing the remaining vapors, controlling the admission of

View of Wyatt's Test Floor

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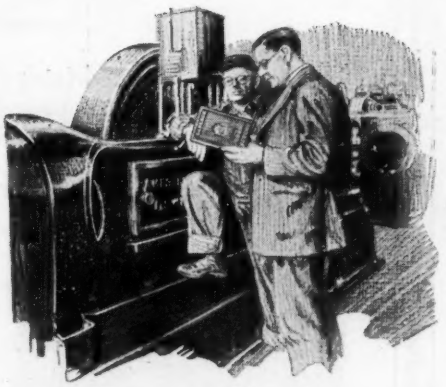

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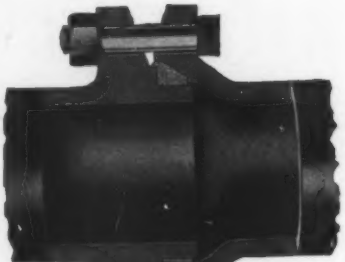

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charging stock in accordance with the reflux condensing action to provide a supply of charging stock and reflux condensate in proportions of less than 25 per cent charging stock and more than 75 per cent reflux condensate, mixing the liquid portion of the charging stock with the hot reflux condensate pumping the hot mixture through said cracking zone and into said separating chamber, and regulating the pump to maintain a substantially uniform cracking condition in said cracking zone.

No. 1,567,212, granted December 29 to Frank C. Vande Water and Frederick R. Sunderman, Newburgh, N. Y., assignors to Petroleum Laboratories, Inc., Newburgh, for an apparatus for treating hydrocarbon consisting of a still, a vapor outlet therefrom, a tracking tube receiving vapors from the still and located beneath the still, a protective element completely surrounding the cracking tube and spaced therefrom, common means to heat the protective element and the still, and means to cause a current of cool air to circulate entirely around the cracking tube and between the cracking tube and the protective element.

No. 1,567,241, granted December 29 to John Collins Clancy, Asbury Park, N. J., for a process of manufacturing hydrocarbons and cyanides which comprises destructively distilling comminuted carbonaceous material in contact with molten alkali metal cyanide, collecting the volatile reaction products, and subjecting the distillation residues to cyanide forming reaction to reconstitute the cyanide decomposed in the distilling step and to form additional cyanide.

No. 1,567,429, granted December 29 to Alfred R. Earl and Thomas W. Reeves, Toledo, Ohio, for a method of continuously distilling mineral oil consisting in heating the oil under pressure by means of steam, then releasing the pressure of the so-heated oil and passing the same into an expansion zone, where part of the oil vaporizes, conducting away the vapors as formed and fractionally condensing the same, withdrawing the unvaporized oil and further heating the same while not permitting vaporization of the oil, passing the said heated oil into an expansion zone maintained at a pressure below atmospheric and there permitting vaporization of the lighter products to take place, withdrawing and condensing the vapors so formed, withdrawing the unvaporized oil from said expansion zone and heating it by direct contact with superheated steam while maintaining the same under sufficient pressure to prevent vaporization of the oil, releasing the pressure of said oil and passing the heated oil into an expansion zone maintained at a pressure below atmospheric, thus permitting part of the oil to vaporize, withdrawing the unvaporized oil from said last named expansion zone.

No. 1,567,455, granted December 29 to Daniel L. Newton, Fullerton, Calif., for an evaporating still comprising a vertical casing, a lower, a middle and a top partition therein forming at the bottom an oil compartment, a residual oil compartment thereabove, a steam compartment above the residual oil compartment, and a vaporizing chamber at the top, a series of small bore pipes leading from the oil compartment to the vaporizing chamber, a series of large bore tubes leading from the vaporizing chamber to the residual oil compartment. a steam inlet to the residual oil compartment, means for feeding oil to the oil compartment, means for withdrawing the vapors at the top of the still, means for withdrawing the residual oil, and means for introducing a heating medium into the heating compartment.

No. 1,567,456, granted December 29 to Daniel L. Newton, Fullerton, California, for an absorption tower comprising a tank divided internally into a plurality of compartments, means for supplying a gas under pressure to one of the compartments, means for conducting the gas from said compartment successively through the other compartments, means for supplying an absorbing agent to one of the compartments and from the latter to the other compartments, and mixing units in said compartments, each mixing unit comprising a plurality of tubular members extending from one compartment to an adjacent compartment having ports arranged to utilize the pressure of the gas for moving the absorbing agent from the first

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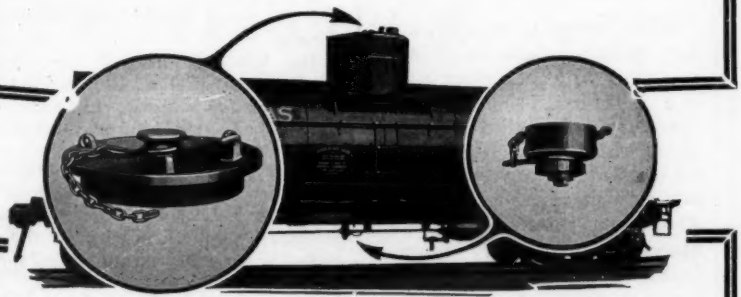

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compartment to the second compartment, and for intermixing the two.

No. 1 567,457, granted December 29 to Daniel L. Newton, Fullerton, Calif., for a continuous process of distilling and blending hydrocarbons from an absorbing medium containing hydrocarbons from casing head gas in solution to produce a commercial stabilized gasoline, the steps of partially distilling the medium, conducting the medium successively through a series of chambers in one direction, mixing steam with the distilled vapors and conducting the mixture under pressure through said chambers in the opposite direction, and causing a repeated intimate contact between the medium and the mixture whereby the hydrocarbons are distilled off and blended.

No. 1,567,458, granted December 29 to Daniel L. Newton, Fullerton, Calif., for a distilling and blending apparatus for a continuous process to recover a stabilized gasoline from an absorbing medium containing considerable hydrocarbons suitable for motor fuel comprising a heated distilling chamber provided with means for spraying the absorbing medium, a heated distilling and blending chamber having a perforated bottom, recirculation tubes over said perforations, said tubes being provided with spaced openings, means for conducting the absorbing medium from the distilling chamber to said distilling and blending chamber, means for conducting the hydrocarbon vapors from the distilling chamber to the bottom of said distilling and blending chamber, and means for introducing live steam to said vapor conducting means.

No. 1,567,933, granted December 29 to Heinrich Preller, Berlin-Friedenau, Germany, for a device for recovering mineral oils and bitumens from substances containing the same, a reservoir adapted to contain a treating liquid, a set of drums in said reservoir, the alternate drums of said set being rotatable in opposite directions whereby the material undergoing treatment advances in a zigzag path.

No. 1 568 016, granted December 29 to Joseph H. Adams, Brooklyn, N. Y., for a process of converting hydrocarbon oils comprising subjecting oil to direct contact with an electric resistor, immersed therein and heated electrically to a cracking temperature, and maintaining a super-atmospheric pressure upon the oil under treatment.

No. 1,568,018, granted December 29 to Charles N. Forrest, Rahway, and Harold P. Hayden, Perth Amboy, N. J., assignors to the Barber Asphalt Co., Philadelphia, for a process of destructively distilling and gasifying hydrocarbon minerals which consists in charging therewith pieces of divided inert refractory material as a carrier, passing the resultant porous charged aggregate, towards its exit therefrom, sphere of reaction, and subjecting the aggregate, towards its exit therefrom, to a limited counterflow of combustion

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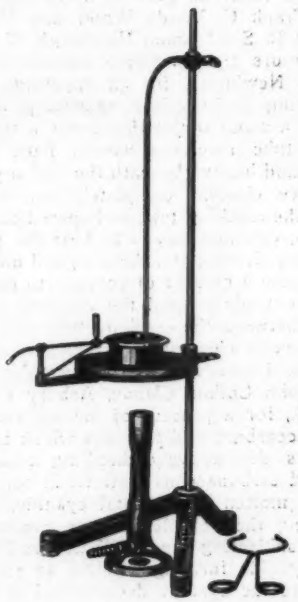

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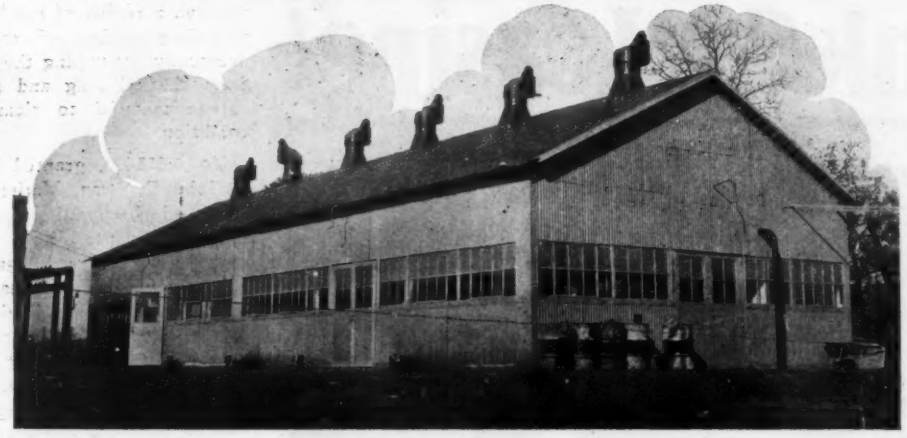

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agent, so as to create in the sphere of reaction a region of combustion and a preceding region of cracking, thus eventually consuming the coke formed from the cracking and restoring the carrier material to clean, uncharged condition.

No. 1,568,028, granted December 29 to John C. Swan, Marietta, Ohio, for a method of separating condensable hydrocarbon vapors from gases which comprises passing the gas through a column of liquid and maintaining the temperature of the liquid below the condensing temperature of the component to be separated by circulating a refrigerating liquid through a refrigerating plant and in heat exchange relation to both the interior and exterior of the column.

The Low Stage Circuit

(Continued from page 20)

into intake line of compressor so as to save the gas. When the safety valve leaks due to mechanical fault it should be corrected at once, periodically it should be tested, it would appear that the safety valve could be piped to a common tank from which the gas could be reclaimed, at any rate knowing how essential the safety valve is its proper location should be looked into from the viewpoint of accessibility.

The cooling coils require attention, they should be easily accessible for repairs as they are subject to corrosive effect of water, scum deposit, leaks, and freezing up in winter months. At all times should the cooling water be on them, leave the water off them only a few minutes and you will notice loss in production, drop in intake gas volume and excessive temperature of outlet gas from low stage accumulator tank. The cooling coils alone afford lots of study as the skillful operator can vary his product by temperature and pressure regulation.

We finish the circuit at accumulator tank. It must be safe for pressure requirement, be properly equipped with water drain, gasoline outlet, safety valve, pressure gauge, etc—. Whether there is a tank for each low stage unit or one tank for all low stage units, much is to be thought of in this circuit and I will leave it to you, particularly the safety factor and the installation of oil trap.

Ventilation Bulletins

American Blower Company, Detroit, Michigan, has just released two bulletins on ventilation. One describes the new permanent wall fixture for the American Blower Reversible Ventilating fan, and the other gives a complete description of "Sirocco" Air Washers. Copies of both bulletins will be mailed upon request to the company.

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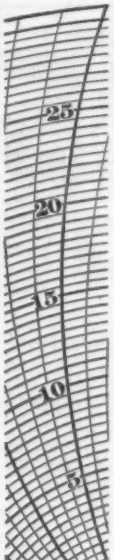

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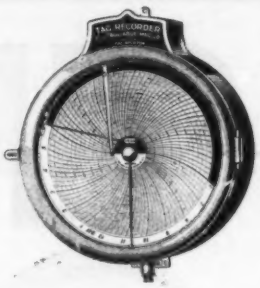

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REFINERY AND GASOLINE PLANT ACTIVITIES

O. C. Smith Now With Graver Refiner Division

Graver Corporation has secured the services of another experienced refinery technologist. O. C. Smith, who has been with Skelly Oil Company, in charge of all refinery operations at their Eldorado plant, is now with the Refinery Division of Graver Corporation as chief technologist.

After obtaining his A. B. and A. M. degrees from the University of Missouri and serving on the faculty for two years as assistant chemist, he later joined the Oklahoma A. & M. College as Research Chemist. Following this he entered the industrial chemical field as night superintendent for what is now the Monsanto Chemical Company, leaving there to become general superintendent of the Mid-Continent Chemical Company at Sand Springs, Okla. The Cosden Company then made him superintendent of the gas and acid recovery plants at their West Tulsa refinery, where he served until joining with the Skelly organization.

Technical Subjects for Refiners Meeting Again

Success of the introduction of technical subjects into the program of the Western Petroleum Refiners Association last year has resulted in a decision to give over one day of the convention at Fort Worth to topics of this sort.

The technical committee of the association met in Tulsa January 4 to outline this part of the program. C. L. Henderson of the Vickers Petroleum Company, Wichita, Kansas, is chairman of this committee and will work out this part of the program.

The convention dates are March 2, 3 and 4. The sessions will be held in the Texas Hotel.

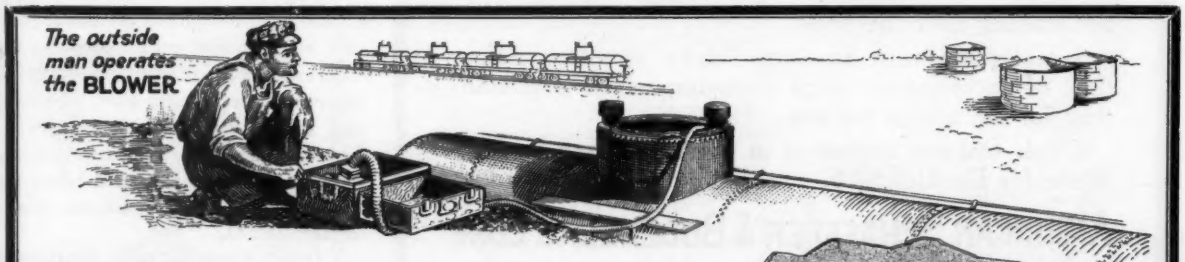
The technical part of the program last year is credited with giving the association its best convention. Attendance ran higher than common, while interest in the sessions was keener. This due to the fact that the technical subjects draw men, who otherwise might not attend the convention. They come for a special purpose and are found in place when the program begins.

Other parts of the program for the convention will be worked out later. Howard Bennette, managing director of the association, expects the Fort Worth meeting to surpass that at Kansas City last year.

Argentine Refinery Ready

The new government oil refinery at La Plata, Argentina, has just received its first cargo of crude petroleum from the government oil wells at Comodoro Rivadavia, according to a report received from Assistant Trade Commissioner Sherwood H. Avery at Buenos Aires, by the Department of Commerce. The cargo consisted of 6300 metric tons of crude oil and was discharged from the tank ship Florentine Ameghino into the large tanks at the refinery.

The process of refining will begin January 1 or earlier, when the daily consumption of crude will be about 1000 tons. The tankers are scheduled to transport the crude petroleum to La Plata from the government wells and later to proceed to Buenos Aires with cargoes of refined petroleum products.



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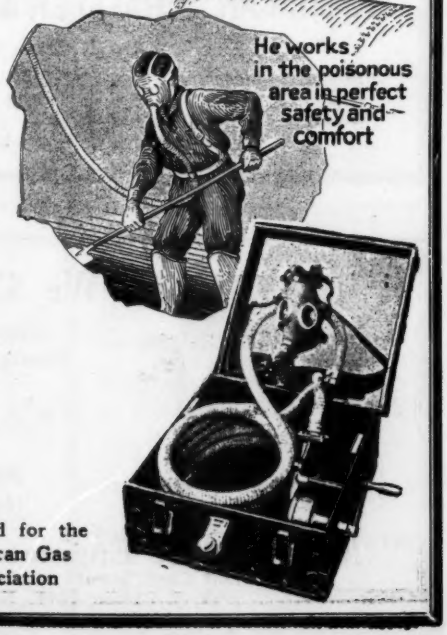

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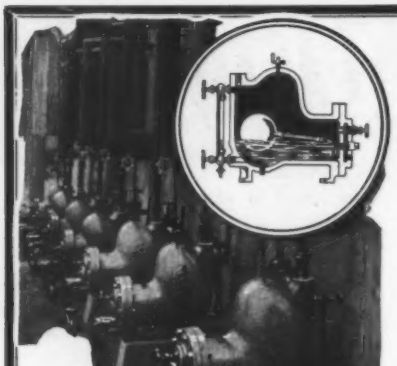

Trap Your Gasoline

Illustration shows American Ideal Traps in the Absorption Tower of the natural gasoline plant of Palmer Corporation, Schwartz, La. These traps are used to trap gasoline from the absorber and to catch the residue gas passing back to absorber, where it is again picked up by the mineral seal spray and the gasoline absorbed by same.

AMERICAN IDEAL STEAM TRAP

has an unusually large valve opening, consequently you can use a smaller, therefore a less expensive American Ideal Trap and handle the same volume.

This extra large valve orifice makes it impossible for the valve to clog or chatter. Seat can be removed without making disconnections.

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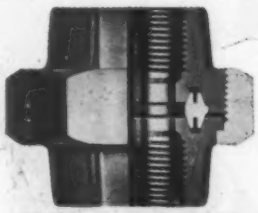

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Apex Indicator Checks Up Fuel Waste Through Stacks

A new boiler room instrument, known as the "Apex" pneumatic CO_2 indicator, has been developed primarily to meet the demand from the smaller steam power and heating plants for a simple and inexpensive instrument for measuring the fuel wasted up the chimney.

The manufacturer claims that the "Apex" indicator will operate accurately with about five minutes' attention once a week. The outfit is generally warranted for steam boilers even as small as 50 horse power, in view of the fuel savings that can be expected through the intelligent use of a reliable CO_2 indicator.

Two principal parts make up the "Apex": the actuating device, known as the CO_2 meter, and the gauge proper, known as the "Type Z" indicator. The flue gas flows through the CO_2 meter continuously, developing a changing pneumatic pressure within it, the magnitude of the pneumatic changes depending upon the percentage of CO_2 present in the gas. The CO_2 is absorbed in a dry cartridge placed in the meter. The absorption of CO_2 causes a shrinkage of the gas flowing through the meter, and hence a reduction in the pneumatic pressure. Any given percentage of CO_2 in the gas will produce a definite pre-determined pneumatic pressure, which is employed for operating the indicator. This indicator consists of a manometer containing a glass tube filled with colored liquid, which changes its level according to the pneumatic pressure applied to it. A scale located beside the indicating manometer is graduated in percentages of CO_2.

A simple stream of water aspirator is used to draw the gas from the boiler through the meter. A large volume of gas is by-passed around the meter at the same time, under the action of the aspirator, which results in speedy response to change in furnace conditions.

More complete information will be furnished by the Uehling Instrument Company, Paterson, New Jersey.

Gaso Pump and Burner Catalog

Gaso Pump and Burner Manufacturing Company, Tulsa, Oklahoma, has recently released a new catalog describing its products in detail. This company has been building pumps for the past ten years, and has supplemented this line with a variety of fittings of more or less special character to meet the requirements of the pipe line companies in transporting oils under high pressure.

The entire line of Gaso Pumps and Fittings is fully illustrated and described in the catalog, copies of which will be mailed to anyone on request.

EXTRACTS OF REFINING TECHNOLOGY

Decomposition of Paraffin Wax—An interesting article was published in Proc. K. Akad, Wetensch, 1925, volume 28, pages 286-96, on the decomposition of paraffin wax at a temperature of 450 degrees C. in the presence and in the absence of hydrogen under high pressure.

The products which were obtained by heating for various periods of time were compared in this article. The hydrogen which was used in berginization remains in the gases, but prevents the loss of hydrogen from the residues which occurs in cracking, practically no residue non-volatile below a temperature of 300 degrees C. being obtained after treatment for a period of four hours. In the early stages the proportions of gas and gasoline formed are less when hydrogen is used, but in the later stages they are higher. The presence of hydrogen does not cause the saturation of unsaturated compounds formed, but causes the molecules to break down more regularly than in cracking, and diminishes polymerization and formation of coke.

* * *

Sludging Test for Transformer Oil—It is not necessary to reproduce the conditions of the transformer so long as the results obtained are concordant and give an indicatiion of the behavior of the oil in use. The chief factors which cause the deterioration of oils in transformers are oxygen, heat and catalysts. Oxygen has great influence; sulphur not so great an influence as was formerly supposed. A temperature of 120 degrees C. is considered to be the proper maximum temperature of the test, as above this temperature changes set in which are not produced in the transformer. The influence of the electric field is not great.

Tests which were made with the sodium peroxide method, which is described in Elektrotech. Zeit,. 1923, 600, 1098, gave moderately concordant results, and it is suggested that this test might be of practical value if frequently checked by the standard sludge test. The value of the standard test is greatly reduced by the omission of oxygen and reduction of time of testing to fifty hours. Petroleum, 1925, volume 27, pages 1377-1383.

* * *

Conversion of Mineral Oils Into Colloidal Products—The formation of sludge in transformer oils is due primarily to a reaction with water and atpospheric oxygen, which is catalyzed by condensation in the capillary spaces of the insulated coils, etc., which are immersed in the oil. The products consist mainly of acidic substances and partly also of asphaltenes. These impurities can be largely removed by treatment with 8 per cent of fuller's earth, in stages, at a temperature of 60 degrees C. Silica gel has little or no purifying action. Z. angew. Chemie, 1925, volume 38, page 659-662.

* * *

Corrosion of Copper Tubes by Petroleum—A copper tube was used in an apparatus through which a current of petroleum was passed. The crude oil was lead to a gasifying apparatus by passing through this tube, and the spiral tube itself was surrounded by the hot waste gases which are obtained from another part of the process and in this way they were preheated and a certain amount of heat was recovered. In a day's time there were passed through the tube about forty liters, or approximately 31 kilograms of crude oil. After a period of two weeks had elapsed the copper tube was filled with a grayish black mass, which clogged up the pipe up to a passage of two to three milimeters width, while the thickness of the walls had been reduced to one-tenth of a millimeter. The result was that the tube broke.

The analysis of the material that was recovered from the interior of the tube showed that it contained 72.56 per cent of copper, 20.90 per cent of sulphur and

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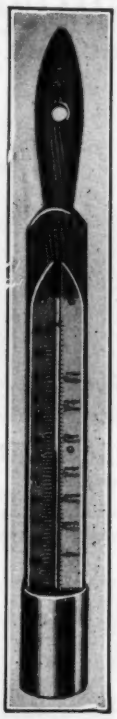

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The illustration shows our tank thermometer No. J-2660, range 30-220° F., wood back with handle and metal cup at bottom to retain liquid around bulb till temperature is taken.

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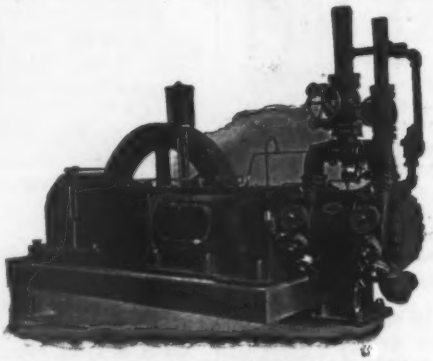

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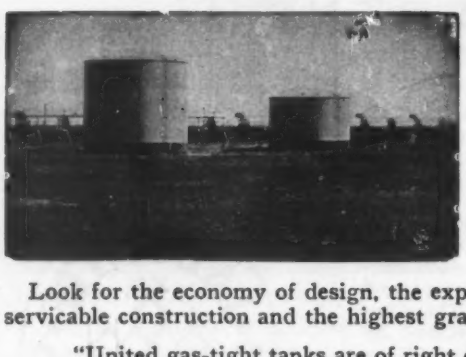

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5.02 per cent of carbon. A small part of the copper and sulphur was apparently oxidized to the form of copper sulphate, which amounted to about 1.10 per cent. The mass also appeared to contain a certain percentage of hydrogen, which was, however, not determined. After subtraction of the percentage of copper, which is combined to form copper sulphate, then the proportions of sulphur and copper left correspond to the formula of cuprous sulphide, Cu_2S.

It follows that this high per cent of sulphur can be due only to the crude oil that is being handled. The oil stored in a tank on the plant was accordingly sampled and found to contain .104 per cent of sulphur. In a day's operation of the plant 40 liters of oil are processed and in a period of 15 days this amounted to 465 kilograms. The sulphur content of this oil amounted to 484 grams, which quantity was more than sufficient to form the copper sulphide which was collected. Even when the percentage of sulphur in the crude oil was normal, approximately .01 to .05 per cent, it was found that after a period of time had elapsed the copper piping was destroyed. Of course in this case it took much longer for this to happen. As the copper sulphide that is formed in this manner is porous, it does not form a protective film over the copper piping, and the result is that the copper is attacked underneath the top covering of sulphide and soon the entire tube is destroyed. It, therefore, follows that copper cannot be used with crude oil at elevated temperatures. Chemiker Zeitung, 1925, page 952.

Refining Mineral Oils—Vegetable and mineral oils and the like are purified by means of porous substances, such as kieselguhr, carbon and colloidal silicic acid, which has been impregnated with small quantities of sulphuric acid. For example, kieselguhr and dilute sulphuric acid are mixed together to form a pulp. The pulp is pressed to remove the excess acid, and is then dried by heating with agitation until sulphurous fumes are evolved. Twenty kilograms of the product are used to purify 1000 kilograms of Russian spindle oil. British Patent No. 239,169.

* * *

Cracking Hydrocarbons—In cracking heavy oils, such as gas oil, in order to produce gasoline, etc., the amount of pitch, etc., in the oil is regulated so as to minimize the carbon deposit by passing the oil through a head of fuller's earth or other absorbent clay or filtering agent, such as silica gel, supported in the still, and by withdrawal of pitch-laden oil and supply of fresh oil. In cracking by circulating the oil from a drum by a pump through a tubular heater, a layer of fuller's earth, etc., is supported by a perforated screen which is thrown across the drums. The heater discharges into the drum by a pipe which is located

above a layer of fuller's earth. Vapors pass up a reflex tower, down which the fresh oil is supplied and the reflex liquid is passed by a pipe into the oil, leaving the drum on its way to the heater. Additional oil may be supplied through the bearings of the pump. Oil containing tar, etc., is withdrawn by a pipe from the surface of the filtering layer. Pressures of 90 to 300 pounds are maintained in the apparatus. British Patent No. 232,-178.

* * *

Chemical Analysis of Gasoline—This was the main subject of a recent meeting of the Institution of Petroleum Technologists in London, which was reported in the Chemical Age of London, Nov. 14, 1925, page 494.

One paper delivered at this meeting dealt with the determination of the unsaturated hydrocarbons in gasoline. It was pointed out that the term "unsaturated" in this connection had a restricted meaning, being confined to those hydrocarbons containing one or more double bonds which absorbed bromine readily under the conditions of the usual tests. No satisfactory method seemed to have been devised for the determinatiion of the proportion of unsaturated hydrocarbons present in a given sample of gasoline. The main ideas in the article may be summed up as follows:

First assuming that the unsaturateds present are mono-olefines, each molecule should absorb two molecules of bromine. If, therefore, the molecular weight and the bromine absorption of the unsaturateds were known, an estimation could be made of the proportion of unsaturateds present. Second, if from the total loss in strong sulphuric acid the aromatic content were subtracted, the difference should be the unsaturateds. In regard to the first idea the Hanus test was used, and it was found for a particular gasoline that on fractionating the bromine adsorptions showed that the unsaturateds appear to be fairly evenly spread over the various fractions.

For the determination of the mean molecular weight it was assumed that this could be taken as of the same order as that of the whole gasoline. The acid losses presented no particular difficulty. Where possible, 100 cubic centimeters of the sample of gasoline were weighted into a funnel, shaken for half an hour with 300 cubic centimeters of acid and allowed to stand over night. The residual gasoline was tapped off carefully and weighed. Aromatics were determined by the modification of the Tizard-Marshall method, in which the difference of the anaaline point of the gasoline, after washing with three volumes of 80 per cent sulphuric acid and an equal amount of 98 per cent of sulphuric acid was taken as the change of aniline point due to removal of aromatics.

* * *

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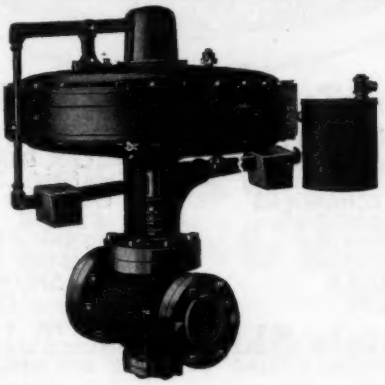
For this purpose, we manufacture the DUPLEX VACUUM REGULATOR, which acts as a safeguard when used on the vapor lines connected to storage tanks, for the recovery of the gases, the purpose being to prevent the pulling of a vacuum.



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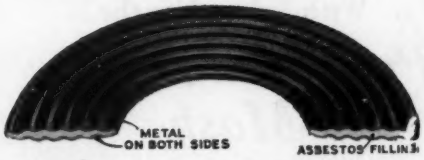

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With Safety Use the
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Complete protection for the operator, using fresh air at all times.

Arms, Legs and Body always free to work with.

Furnished in neat durable carrying case.

Larger outfit can be supplied with light blower and durable case for extra heavy work.

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pointed out in a paper which was read before a recent meeting of the Institution of Petroleum Technologists in London that there is no method of petroleum distillation which has won such rapid and widespread popularity as the high vacuum distillatiion system. It was claimed therein that nearly all the large refiners in Europe and the United States as well as in India have introduced this new system of petroleum distillation.

The principal advantage of high vacuum distillation consists in that it is precisely the inferior, heavy asphaltic oils (the conversion of which into heavy lubricating oils was unprofitable and frequently impossible), which are the most advantageous for high vacuum distillation, as all the fractions, even the heaviest cylinder oils, are won as distillate (overhead distillates), and not as residual bottoms. Only the asphalt, a superior coke-free material, remains in the still. Paraffinoid oils can also be distilled with equal advantage. It has been proven that the products obtained are better physically and that there are many other advantages connected with the process.

Bulletin on Boiler Water

Distillation as a means of producing pure boiler feed make-up water has created such general interest that a booklet on this subject has just run into its fifth edition.

This new edition has been completely revised to cover the latest developments that are effecting particularly satisfactory results in several new central stations and industrial power plants. Many new diagrams are included to show approved layouts for various operating requirements and the conditions under which evaporators can be used advantageously are thoroughly explained.

Free copies of this booklet may be obtained by writing to the publishers, The Griscom-Russell Company, 90 West Street, New York.

Equipment Bulletins

Schutte and Koerting Company, Philadelphia, Pennsylvania, manufacturers of refinery equipment, have published two new bulletins which are ready for distribution and will be sent upon application.

Bulletin 5-N describes recooling spray nozzle systems installed by this company. It is said that these systems save from 90 to 95 per cent of the water consumed in a plant.

The other bulletin covers a number of mechanical appliances used in the refining industry, including heat transfer equipment, oil coolers, vapor condensers, gas coolers, mechanical burners, oil pumps and strainers, valves, injection nozzles, etc.

Four-barrel Heat Exchangers

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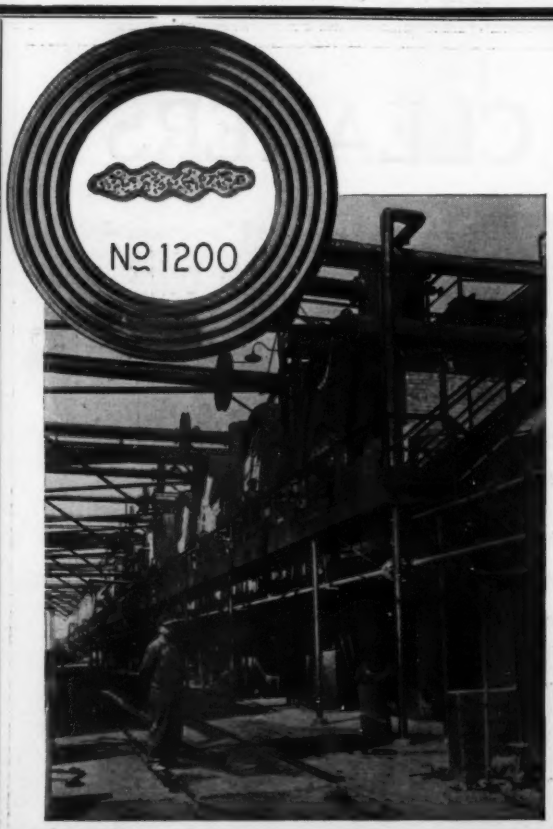

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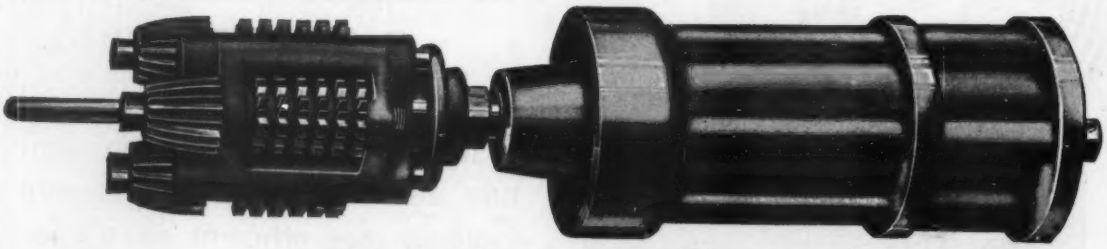

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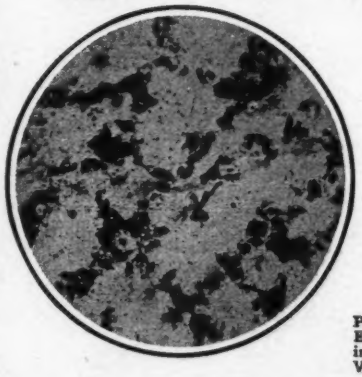

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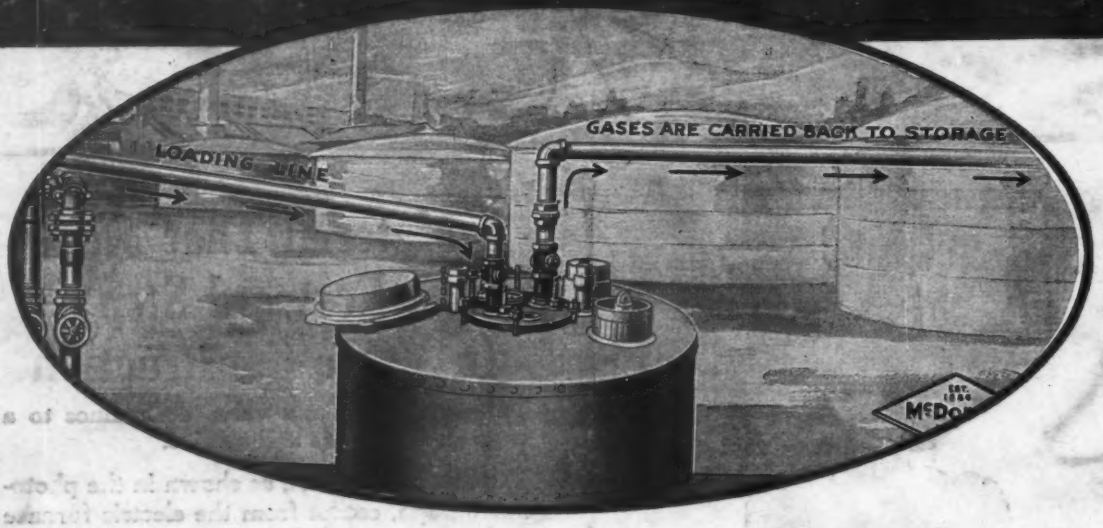

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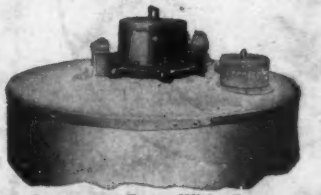

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